FELLOWSHIP REPORT

Summary of work activities

Patricia Garvey
Intervention Epidemiology path (EPIET)
Cohort 2014

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;

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 response capacity for effective field investigation and control at national and community level to meet public health threats;
- 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 guide1.

Pre-fellowship short biography

Before EPIET, Patricia Garvey was employed as a surveillance scientist in the Gastroenteric, Zoonotic and Vectorborne Disease team at the Health Protection Surveillance Centre in Dublin, Ireland. She specialised in the epidemiology of verotoxigenic E. coli, salmonellosis and cryptosporidiosis in particular. She has a PhD in molecular microbiology and a Masters in Epidemiology.

Fellowship assignment: Intervention Epidemiology path (EPIET)

On 22 September 2014, Patricia started her EPIET fellowship at the Health Protection Surveillance Centre, Dublin Ireland, under the supervision of Dr. Lelia Thornton. Her EPIET frontline coordinator was Dr. Kostas Danis. 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

Serogroup-specific seasonality of verotoxigenic Escherichia coli, Ireland 2004-2014

Typically, human verotoxigenic *Escherichia coli* (VTEC) infections are reported as being more common in late summer, but this may vary by serogroup. The aim of this study was to describe the seasonality of VTEC infections in Ireland and the potential serogroup differences in seasonality.

Using national notification data for VTEC serogroups O157 and O26 for the period 2004-2014 (n=2,569), we calculated the phase for seasonality for each serogroup, and the difference between the two phases. We used times series quasi-Poisson regression, fitting a term for temporal trend, a sine

[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

wave with a period of 12 months for seasonality, and terms for interaction by serogroup. We compared the phase shifts of the two serogroups using the Wald test.

The two VTEC serogroups appeared to differ in their seasonality with the peak in VTEC O26 notifications generally occurring around eight weeks earlier than VTEC O157. This earlier peak in incidence for VTEC O26 has become progressively more consistent as the number of VTEC O26 notifications has risen. Using times series quasi-Poisson regression, the predicted peak in cases occurred in July for VTEC O26 and in September for VTEC O157, with the two month difference in phase (seasonality) by serogroup being statistically significant (p-value <0.001). The difference in seasonality remained significant (p-value <0.001) for sporadic cases alone, with the same predicted two month difference.

The consistent differences in seasonality identified here between the two most common VTEC serogroups suggest that there are noteworthy underlying differences in disease aetiology between the strains. Possibilities include differences in primary animal reservoirs, in seasonal distribution in the environment or in human behaviours. We recommend further exploration.

Role and outputs:

Patricia was the principal investigator on this investigation. She conceived the study question, performed the analyses, published a manuscript in a peer-reviewed journal (1), presented the findings orally at a national conference (2), with a further abstract accepted for oral presentation at an international conference (3).

Supervisor: Dr. Paul McKeown, Specialist in Public Health Medicine, HPSC

Evaluation of the Irish respiratory syncytial virus (RSV) surveillance system

RSV became a notifiable disease in Ireland in 2012, supplementing the laboratory reporting system in existence since 2003 which uses data from the National Virus Reference Laboratory (NVRL). The purpose of the system is to monitor trends annually and seasonally, and identify the persons most commonly affected. Notifiable disease data are maintained on the Computerised Infectious Disease Reporting (CIDR) Database. We aimed to evaluate the RSV system in terms of completeness and timeliness (to characterise the timing of RSV seasons) and compare the representativeness of NVRL and CIDR systems.

We described the notification system in terms of its purpose, operation, and outputs. We evaluated the completeness of selected variables, calculated the time intervals between onset, specimen collection and reporting, and compared the distribution of cases by age, sex and geographical area to that of the laboratory reporting system.

Completeness varied between fields and across Health Service Executive-areas; most notable was the reduction in completeness of the variable Community Care Area due to fast-tracking. The median time taken from date of sample collection to notification (total time interval) across the whole country was six days. The total time interval was longer (up to eighteen days) outside of RSV season compared to during RSV season. The CIDR system was better able than the NVRL system to provide data on the RSV epidemiologic characteristics (age, geographical area) in Ireland. Onset of the RSV season varied by just two weeks between the three years.

In conclusion, the RSV CIDR surveillance system appeared to be timely, and more representative compared with the old NVRL system. It provides the baseline data that is necessary to measure disease burden. As there are only three years data, it may be beneficial to re-evaluate this system in 3-5 years time to see if it remains as timely and representative, and in particular to confirm that the system can be used to characterise the timing of RSV seasons and thus inform the timing of prophylaxis.

Role and outputs:

Patricia was a co-investigator on this project with Anne Carroll (EUPHEM cohort 2013). She provided the description of the surveillance system (historically and currently), performed the statistical tests to compare the distribution of cases in the notification system to the cases in the NVRL surveillance data, and contributed to writing of the final report (4).

Supervisors: Dr. Rob Cunney (Consultant Microbiologist), Dr. Joan O'Donnell & Dr. Paul McKeown (Specialists in Public Health Medicine), HPSC

Setting up enhanced surveillance for hepatitis E in Ireland

Hepatitis E virus (HEV) is believed to be one of the most common causes of acute hepatitis worldwide. Infection was historically associated with poor hygiene and transmission by the faecal-oral route in developing countries. However, it is now recognised as an emerging disease in many developed countries, with an increasing number of human cases being identified across Europe. Both England and France have enhanced surveillance for HEV to collect information on: symptoms and outcome; underlying clinical conditions; and possible risk factors.

In Ireland, in 2014, the National Virus Reference Laboratory (NVRL) at University College Dublin identified nine laboratory confirmed or probable cases of acute or chronic HEV. Following a change in the diagnostic algorithm in June 2015, increasing numbers of HEV infections were diagnosed at NVRL (6 cases in Jan-Jun 2015, 24 cases in Jun-Dec 2015). On December 15th 2015, the Infectious Disease Regulations in Ireland were amended to add Hepatitis E infection to the list of notifiable diseases.

Little is known yet about the burden or risk factors for HEV disease in Ireland. It was proposed that an enhanced surveillance system be established to collect information on the clinical features and on risk factors for infection in Ireland, to guide future prevention strategies.

We conducted a literature search to inform discussions on possible enhanced surveillance variables and drafted a document outlining the rationale for the introduction of enhanced surveillance for HEV in Ireland and an enhanced surveillance form based on the Public Health English and French equivalent. Stakeholders discussed this by teleconference and provided written comments, which were incorporated into a final version. Agreement was reached to implement enhanced surveillance for one year commencing July 1st 2016 before evaluating.

Role and outputs:

Patricia was the lead on this project. She conducted a literature search on HEV epidemiology, drafted the enhanced surveillance form, participated in negotiations for agreement on the final draft with regional stakeholders, and provided detailed instructions for HPSC CIDR team for how to incorporate the new enhanced questions into the national infectious disease database. The enhanced surveillance form was published at HPSE website (5)

Supervisor: Dr. Lelia Thornton, Specialist in Public Health Medicine, HPSC

Competencies developed:

Time series analysis was an important skill to develop during my fellowship. This is a key tool I expect to use again and again in my role in monitoring and analysing Irish national surveillance data in the future. I envisage many potential applications including outbreak detection, monitoring the impact of disease control programmes, etc.

Developing an enhanced surveillance form for HEV was an exciting project to work on, as this is an emerging infectious disease in Europe. Through liaising and negotiating with regional public health department, I learnt the value of balancing the relative importance of competing infectious disease surveillance priorities when deciding on the scope and duration of new surveillance activities.

2. Outbreak investigations

Spread of mupirocin-resistant meticillin-resistant staphylococcus aureus (MR-MRSA) and high dependency: lessons to be learned

In June 2014, an outbreak of mupirocin-resistant (MR)-MRSA spa type t127 (and closely-related t922) was identified in a large tertiary hospital in Ireland. We described the extent of the outbreak and undertook a matched case-control study to investigate risk factors for infection/colonisation.

Cases were diagnosed by the hospital laboratory following routine and active screening. Controls were randomly-selected from in-patients on affected wards with negative MRSA screening swab results within 10 days of the matched case. We collected information from hospital databases and patient charts. We calculated adjusted matched odds ratios (amOR) using conditional logistic regression.

Between November 2013 and June 2015, there were 41 cases; the median age was 73 (range 47-96) years; 78% were male. Case numbers peaked in July 2014. Overall, 27 (67%) of cases were linked to Ward W either at detection or historically, with cases on other wards more common later in the outbreak. The weekly number of patient bed days on Ward W exceeded maximum capacity (n=245) for four consecutive weeks (weeks 17-21 2014), peaking at 252 bed days in week 20 2014. Male sex (amOR=21; 95%CI 0.99-454), urinary catheterisation (amOR=12; 95%CI 0.98-154), occupational therapy (amOR=9.9; 95%CI 1.6-61), vascular consultation (amOR=5.1; 95%CI 0.89-29), and length of stay (amOR=1.1; 95%CI 1.0-1.1 per in-patient day) were associated with MR-MRSA.

Underlying high-dependency, including prolonged hospitalisation, urinary catheterisation, vascular surgery and occupational therapy consultation, were associated with MR-MRSA. Overcrowding may also have contributed to transmission on Ward W. Prospectively recording the dependency of patients to optimise infection prevention and control measures, and the avoidance of overcrowding, are recommended to prevent/control future outbreaks.

Role and outputs:

Patricia was the lead epidemiological investigator on this outbreak. She wrote the protocol, developed the data extraction forms, developed the data entry mask, performed the data entry, analysed the outbreak data, and drafted an internal epidemiological report for the hospital authorities (6). She also presented this work orally at two national conferences (7,8), and has had an abstract accepted for oral presentation at an international conference (9). She presented in poster format at two conferences [one international (10) and one national (11)] and has a manuscript in preparation for submission to a peer-reviewed journal (12). Oral presentations were also made to the Outbreak Control Team, to the Hospital Infection and Prevention Control Team, at the mini project review meeting 2015, and at HPSC Journal Club.

Supervisors: Prof Ed Smyth and Prof Hillary Humpreys, Consultant Microbiologists, Beaumont Hospital

Gastroenteritis school outbreak linked to reheated prepared food, Ireland, 2016

On 25th January 2016, the environmental health service received a report of 70 cases of gastroenteritis at a school event in the south of Ireland. Students from several schools participated. We undertook a cohort study to identify the source of infection.

We defined a case as an attendee with diarrhoea or abdominal pain, with symptom onset within 96 hours of the event start. We employed an anonymous online questionnaire to collect data on clinical symptoms and food exposures. Poisson regression was used to estimate adjusted risk ratios (aRR).

Of the 177 attendees, 108 (61%) responded. Among those, 76 (70%) cases occurred. The epidemic curve was indicative of a common point source. Diarrhoea (93%) and abdominal cramps (99%) were the predominant symptoms. One person was hospitalised. No organism was identified. Chicken curry was associated with illness [aRR=3.8 (95% CI 1.4-11)]. It was consumed by 95% of cases, with a nine hour median interval between consumption and onset. Environmental health investigations suggested that reheating of the ready-made chicken curry was likely to have been inadequate. Anecdotal participant reports of ‘cool’ chicken supported this. No leftovers were available for testing.

Epidemiological and environmental investigations pointed towards the chicken curry as the most likely outbreak vehicle. The clinical presentation, interval between consumption and onset, and deficiencies identified by environmental health were consistent with *Clostridium perfringens* or *Bacillus cereus* contamination. Foodborne outbreak investigations without microbiological findings pose a particular challenge. The foodhandlers were advised of the importance of thorough reheating of pre-prepared foods and were retrained. Extensive prompt environmental investigations, together with timely commencement of the epidemiological study, were key to outbreak management and institution of early control measures.

Role and outputs:

Patricia was the lead epidemiological investigator on this outbreak. She wrote the protocol, analysed the outbreak data, and drafted an epidemiological report for the regional public health department (13). The outcome of the epidemiological investigation contributed to the evidence base used for the implementation of control measures. This work has been presented orally at one international conference (14) and has been accepted for poster presentation at another (15).

Supervisors: Dr. Margaret O'Sullivan, Specialist in Public Health Medicine, Dept. of Public Health, HSE-South

Outbreak hypothesis generation tool

At the outset of an outbreak, it is often difficult to assess whether the proportion of cases reporting consumption of a particular food is higher than you would expect in the general population. Elsewhere, public health professionals have compared food histories reported by outbreak cases against historical food consumption surveys to generate hypotheses during investigation of suspected foodborne outbreaks. The aim of this project was to develop a tool in association with colleagues from the Food Safety Authority of Ireland (FSAI) to assist with hypothesis generation for outbreaks in Ireland.

In 2013, HPSC developed a detailed trawling questionnaire for outbreak cases for use in dispersed outbreaks with no obvious common location between them. In 2008, the Irish Universities Nutritional Alliance (IUNA) undertook a comprehensive 4-day diary-based nutritional survey among 1500 adults in the Irish population. We matched all relevant food items from the IUNA database against those food categories listed in the outbreak trawling questionnaire. Based on these matches, we calculated the proportion of the general adult population in Ireland exposed to each of the food items listed on the trawling questionnaire.

We set up a tool (using Epidata) in which we could input the food history responses from trawling questionnaires on cases early on in outbreak investigations. Data collected in this tool will be extracted to Stata to compare the odds of exposure for each food item among cases with the known odds among the general population (who would represent 'controls'). Food items with Odds Ratios above a certain threshold value could be considered further.

From a validation perspective, we propose to select a few past outbreaks where we were able to identify a food source, and assess what would have been the outcome if we had entered the early trawling questionnaire data from these outbreaks in the new tool.

Role and outputs:

Patricia was the lead investigator on this project. She developed the study protocol, liaised with FSAI staff, and developed the data entry tool. [Stata analyses code still to be written]

Supervisor: Dr. Paul McKeown, Specialist in Public Health Medicine, HPSC and Dr. Wayne Anderson, Food Safety Authority of Ireland

Competencies developed:

The MR-MRSA outbreak was my first experience of a nosocomial outbreak investigation. It was challenging to consider all the possible risk factors for transmission, to understand all the players in the hospital environment, and to understand the potential and limitations of all the data sources/databases from where I might access data. This was my first experience of using EpiData as a data entry tool, and my first experience of accessing data from hand-written charts, both of which I gained experience from. It was valuable also to see the practical aspects of managing an outbreak against the backdrop of treating and managing patients with complex needs, with space at a premium because of an already overcrowded Emergency Department. This was very different to all the community outbreak investigations I had been involved in previously and has added another dimension to my outbreak investigation experience.

In the IID school outbreak, I further developed my Stata skills in undertaking the cohort study, and gained exposure to the management of outbreaks in a regional public health department setting. I

learned to manage the limitations in devising a case definition in the absence of a definitive microbiological diagnosis.

I believe the outbreak hypothesis generation tool will be very practical addition to the tools available to the gastrointestinal team at HPSC. It may also have value to regional public health departments for dispersed local outbreaks. In a world where food chains are increasingly complex, innovative practical tools such as this are essential to guide investigators towards potential hypotheses in diffuse outbreaks caused by extensively distributed foods.

3. Applied epidemiology research

Disease outcomes at circa 36 years in an anti-D cohort of women infected with hepatitis C between 1977 and 1979, Ireland

In the mid 1990s, a group of women were diagnosed with HCV genotype 1b infection following administration of contaminated anti-D immunoglobulin between 1977 and 1979. We conducted a cohort study on women with chronic HCV infection to describe their disease history and estimate the effect of selected host factors on disease progression to provide information for HCV treatment strategies.

A research nurse collected information from records at seven HCV treatment centres on demographics, treatment and health outcomes from the time of first attendance at the service until 31st December 2013. We calculated cumulative incidence, case fatality, and hazard ratios (HR) for disease progression using cox regression.

374 participants were recruited to the study. At the end of 2013, 19% and 5% had cirrhosis and liver-related case fatality, respectively, compared with 10% and 2.4% at the end of 2008. 131/365 (35%) had completed antiviral treatment; 55/131 (42%) had a sustained virological response (SVR). Patients with a SVR following antiviral treatment had a lower rate of cirrhosis compared to treated patients who did not achieve a SVR (adjusted-HR=0.19; 95%CI=0.06-0.65); factors associated with increased cirrhosis rates were high alcohol intake (adjusted-HR=5.9; 95%CI=3.0-12) and diabetes mellitus (adjusted-HR=4.5; 95%CI=2.6-8.7). At the end of follow-up, 321 (86%) participants remained alive, 247 (77%) of whom were still chronically infected.

The risk of cirrhosis and liver-related case fatality in this group were lower than those reported in some previous studies of HCV cohorts; however, disease progression is accelerating. With the advent of new HCV therapies with higher success rates, we strongly recommend that direct acting anti-viral therapy be actively considered for women in this cohort who remain chronically infected. Participants with chronic HCV infection should also be advised of the additive harmful effect of alcohol in the development of clinical signs of disease.

Role and outputs:

Patricia was the lead investigator on this study. She undertook the epidemiological analyses, and a manuscript is at an advanced stage of preparation for a peer-reviewed journal (16). She also presented the study findings orally at an international conference (17), and in poster format at two conferences [one international (18) and one national (19)]. She was awarded a bursary by the European Association for the Study of the Liver (EASL) to present her poster at the EASL conference 2016 in Barcelona, Spain. She also made oral presentations at the EPIET Project Review Module, Lisbon 2015 and at a HPSC in-house Training and Research Forum meeting.

Supervisor: Dr. Lelia Thornton, Specialist in Public Health Medicine

Seroprevalence of hepatitis C virus in the general population in Ireland

In Ireland, no study has been undertaken to estimate the prevalence of HCV in the general population. We undertook a cross-sectional study, to estimate the HCV antigen prevalence among the general adult Irish population, using anonymised residual sera submitted to the National Virus Reference Laboratory, in order to (i) obtain more accurate information on the likely risk of HCV infection, (ii) inform health service planning, and (iii) obtain a benchmark for evaluating the effectiveness of HCV prevention programmes.

Excluding specimens from sources serving patients with high HCV risk, we selected a study sample of persons 18 years or over with probability proportional to the size of the sex and age group strata in the general population; within each stratum, we selected specimens using simple random sampling. We determined HCV antibody positivity using the HCV Ab Architect Abbott HCV antibody test, and HCV antigen positivity using the HCV Ag Architect Abbott HCV antigen test. We calculated proportions weighted for age-, sex- and geographical area. .

Overall, 53 specimens were confirmed as seropositive; weighted seroprevalence was 0.98% (95%CI 0.73%-1.3%). Prevalence of chronic infection was 0.57% (n=33, 95%CI 0.40%-0.81%). This prevalence was significantly higher in males (0.91%; 95%CI 0.61%-1.4%) than in females (0.24%; 95% CI 0.12%-0.49%), and in specimens from HSE-East (1.4%; 95%CI 0.99%-2.0%) compared to specimens from other areas. Although not statistically significant, there was also a higher prevalence of chronic infection among person aged 30-39 years and 40-49 years. No chronic infections were noted in the 18-29 years age group for either sex. Overall, the highest prevalence was in males aged 40-49 years in the HSE-East (5.2%; 95%CI 2.8%-9.3%) and males aged 30-39 years in the HSE-East (3.5%; 95%CI 1.8-6.9%).

In the global context, Ireland appears to be a low HCV prevalence country. Males born 1965-1984 from the HSE-East had the highest prevalence of chronic HCV infection in Ireland. If birth-cohort screening were to form part of the Irish national HCV screening guidelines, we would recommend inclusion of this group.

Role and outputs:

Patricia was the lead investigator on this study. In preparation for this assignment, she attended ECDCs 3rd Hepatitis B and C Network Meeting, 16-18 February 2015. A major theme at this meeting was 'Exploring the possibility of a HCV seroprevalence survey'. She wrote a scoping document outlining the global and European situation regarding HCV seroprevalence and the study justification, and developed a research protocol and application which she submitted for ethical approval to the RCPI Research Ethics Committee (20). She also developed the sampling frame, selected the study sample, and developed the laboratory SOPs for specimen anonymisation. She performed the statistical analyses and has commenced drafting a manuscript for peer-reviewed publication.

Supervisor: Dr. Lelia Thornton, Specialist in Public Health Medicine

Knowledge of HIV Post-Exposure-Prophylaxis (PEP) among healthcare workers in Ireland, 2016: room for improvement

Injuries where there is an infection risk (e.g. human bites, needlestick injuries and sexual exposures) frequently present to emergency departments (EDs), occupational health (OH) departments and sexual assault treatment units (SATUs). Post-exposure prophylaxis (PEP) is an important aspect of HIV prevention following potential exposure. We conducted a survey to assess knowledge of HIV PEP, and awareness of HIV PEP resources, among key healthcare professionals, using an anonymous online questionnaire. Twelve (18%) of 68 respondents answered five or more of six knowledge questions correctly; 49 (72%) cited the Emergency Management of Injuries (EMI) toolkit as a resource. Although most respondents were aware of the EMI Toolkit for HIV PEP, the low number of respondents correctly answering knowledge questions suggests a need for training to avoid potential suboptimal HIV PEP use.

These findings will be shared with the sub-committee of the HPSC Scientific Advisory Committee currently considering revisions to the Emergency Management of Injuries (EMI) toolkit..Through implementation of the National Sexual Health Strategy, further training in the interpretation and usage of the resources within the EMI toolkit, and mechanisms to increase knowledge of HIV PEP will be undertaken. Relevant professional groups will be consulted to identify the best mechanisms to achieve this. Possibilities include presentations at planned study days, and a stand-alone EMI training presentation for new doctors and nurses as part of induction, and presentations at national conferences.

Role and outputs:

Patricia was the lead investigator on this project. She contributed to the survey design, implemented the survey using a survey software tool from Demographix Ltd, London, UK, undertook the data analyses, and drafted the manuscript for publication (21) and the final report (22). She also made an oral presentation on this project at a HPSC in-house Training and Research Forum meeting.

Supervisor: Dr. Lelia Thornton, Specialist in Public Health Medicine and Dr. Fiona Lyons, National Clinical Lead in Sexual Health, HSE Sexual Health and Crisis Pregnancy Programme

Antiretroviral medications for HIV prevention: a survey on prescriber attitudes and practices

Antiretroviral therapy for HIV prevention comprises three aspects: Pre exposure prophylaxis (PrEP); Treatment as Prevention (TasP) and Post exposure Prophylaxis (PEP). At present there is no clinical practice guidance in Ireland for PrEP and TasP. The National Sexual Health Strategy 2015-2020 was launched in October 2015 and a National Clinical Lead appointed. One of the priority actions for 2016 was to develop clinical practice guidance on the use of antiretroviral therapy (ART) for HIV prevention. Working groups have been formed to develop clinical practice guidance in these areas.

The purpose of this survey is to assess the attitudes and practices of HIV/STI and Infectious Diseases clinicians and selected other health care professionals involved directly in HIV/STI case management, in relation to antiretroviral medication for HIV prevention. Approval for the study was obtained from RCPI Research Ethics Committee. The online survey was set up in Demographix software and issued to 118 selected health care professionals (23).

67 (57%) of 118 persons invited to respond completed the questionnaire. The survey closed Monday August 15th 2016, and data analyses are ongoing. The results of this survey will help to inform policy around antiretroviral prescribing for HIV prevention in Ireland.

Role and outputs:

Patricia was a co-investigator on the study. Her role was primarily in implementing the online survey in Demographix software. She will also contribute to analyses of the data collected.

Supervisor: Dr. Fiona Lyons, National Clinical Lead in Sexual Health, HSE Sexual Health and Crisis Pregnancy Programme

Competencies developed:

These research projects provided a great opportunity to work on bloodborne viruses, extending the range of infectious diseases in which I have gained experience.

Compared to the datasets I have worked with previously, the HCV Anti-D dataset was very large and complex, and I was very pleased to have the opportunity to work with such an important dataset, and to develop competencies such as survival analyses and cox regression which are invaluable when assessing data from long-term longitudinal studies.

I was also delighted to have the opportunity to develop and formally submit the research protocol for the HCV seroprevalence study to the Research Ethics Committee (REC). I learnt a lot about sampling, and rigour in study design, from this process. Being the lead on a REC application was one of my personal goals when I commenced EPIET. I also learned to apply weighting to analyses of survey data. This study will provide valuable data for HCV screening policy in Ireland, and I am very proud to have contributed to this important work.

From the HCW surveys on HIV prevention, I developed further my survey skills (deciding on best format for questions, ensuring all the information we wanted was collected in appropriate format for analyses) and gained experience in using the data collection and reporting aspects of a survey tool I had not used previously.

4. Communication

Publications in peer reviewed journals

One manuscript published in Emerging Infectious Diseases (1)

Manuscripts submitted to peer reviewed journals (in review process)

One manuscript submitted to a peer-reviewed journal (21), and two other manuscripts in preparation for submission (12, 16)

Conference presentations

1. Two oral presentations at international conferences (ESCAIDE 2015 (17) & Five Nations Public Health Conference 2016 (14)].
2. Three oral presentations at national conferences [Irish Faculty of Public Health Medicine Summer Scientific Meeting 2016 (2), Irish Society of Clinical Microbiologists Spring Meeting 2016 (7) and the Infectious Disease Society of Ireland Annual Meeting 2016 (8)].
3. Invited oral presentation at 'Controlling Foodborne Viruses' 2015, a national conference organised by *Safe*food (24).
4. Two additional abstracts accepted for oral presentation at ESCAIDE 2016 (3,9).
5. Two posters at international conferences [ECCMID 2016 (10) & EASL 2016 (18)] and a third as co-author [VTEC 2015 (25)].
6. Two posters at national conference [Faculty of Public Health Medicine Winter Scientific Meeting, Dublin, December 2015 (11,19)]
7. One additional abstract accepted for poster presentation ESCAIDE 2016 (15)

Other presentations

Once to Hospital Outbreak Control Team, once to Hospital Infection and Prevention team, twice at EPIET Project Review Modules, twice at mini Project Review Modules, once at HPSC in-house journal club, three times at in-house HPSC Training and Research forum sessions.

Reports

Two outbreak reports (6,13), one study report (22), one application to Research Ethics Committee (20), and co-author on one surveillance report (4).

5. Teaching activities

1. **Case studies: An outbreak of hepatitis in Ogemaw, An outbreak of haemorrhagic fever in Africa, Tampons and toxic shock syndrome, and Epidemic asthma in Barcelona.**

Patricia co-facilitated on the case studies listed above during an Epi-Concept course on Outbreaks delivered at the Health Protection Surveillance Centre, Dublin, Ireland. The attendees on the course were Specialist Registrars in Public Health and Surveillance Scientists employed by the Health Service Executive. The course was delivered during the week 20th-24th October 2014.

2. **Lectures: Infectious Disease Surveillance; Epidemiology of foodborne disease, with particular reference to Ireland; Outbreak investigation –steps, roles, analyses and control; Lessons from outbreak investigations and outbreak surveillance data**

Patricia developed and delivered four one-hour lectures as entitled above at the Dublin Institute of Technology, Cathal Brugha Street, Ireland. The lectures were delivered on 19th November 2014 and December 3rd to students undertaking a Masters in Food Safety Management. Updated versions of the lectures were delivered again on 3rd and 10th December 2015 to the 2015 entrants to course.

3. **Case study: An outbreak of trichinosis in France**

Patricia facilitated the case study above on two occasions (November 19th and 20th 2014) at the School of Veterinary Medicine, University College Dublin. The students were undergraduate veterinary students.

4. **Lecture on infectious disease surveillance and control. Case Study: An outbreak of trichinosis in France**

Patricia developed and delivered a one hour lecture and co-facilitated the case study as above at the offices of the Health Protection Surveillance Centre, Dublin on December 17th 2014 to postgraduate

students undertaking the Public Health for Clinical Specialists Module of the Trinity College Dublin Masters in Medicine.

5. Case study: An outbreak of trichinosis in France

Patricia co-facilitated the above case study on January 21st, February 5th, April 9th, October 16th 2015, January 21st, February 11th, and April 7th 2016 at the offices of the Health Protection Surveillance Centre, Dublin for undergraduate medical students from Trinity College Dublin

6. Lecture: Outbreak Investigation –the 10 steps

Patricia delivered a lecture on outbreak investigation at the offices of the Health Protection Surveillance Centre, Dublin on October 7th 2015 to students undertaking the MSc in Healthcare Infection Management at Trinity College Dublin. The lecture was based on EPIET materials, and was originally developed by Henriette de Valk

7. Case study: An outbreak of salmonellosis at a Dublin wedding

Patricia facilitated the case study above on two occasions (November 18th and 18th 2015) at the School of Veterinary Medicine, University College Dublin. The students were undergraduate veterinary students.

8. In-house Training and Research Forum

Patricia organised a monthly the Training and Research forum at HPSC. The aim of the Forum is to provide an chance for discussion and presentation of research/ projects/work/methodology of research/sharing of skills and learning relating to work undertaken by staff in HPSC. Critically, it provided an opportunity for trainees to present and receive feedback on projects at protocol and/or interpretation of results stage. The Forum commenced in October 2015, and ten speakers have presented their work to date. Four projects were presented at protocol stage, five at results stage, and one session focused on a new computer tool being introduced at HPSC. Discussions have centred on cross-sectional survey design, sample size calculations, evaluation of surveillance system attributes, contact tracing tools, practical application of time-series analyses, and interpretation of cox regression analyses. Patricia identified and scheduled speakers on a monthly basis. She undertook a short evaluation survey, and wrote a 'Reflection and Evaluation' note including the findings of the survey.

Educational outcome:

Developing and delivering these teaching assignments has helped to crystallise in my mind epidemiological concepts and methods, as you have to very precise when providing materials and teaching to students.

I particularly enjoyed working on the Training and Research Forum. I hope that by setting this up, and ensuring momentum by soliciting trainees and staff to present, that it has fostered a more supportive in-house environment for those undertaking research studies and a greater interest in research at HPSC.

6. EPIET/EUPHEM modules attended

1. Introductory Course, Spetses, Greece 29 September to 17 October 2014
2. EPIET outbreak investigation module, Berlin 8-12 December 2014
3. EPIET module on Initial Management in Public Health Microbiology, Stockholm 9-13 February 2015
4. EPIET module on Multivariable Analyses, Vienna 23-27 March 2015
5. EPIET Project Review Module, Lisbon, 24-29 August 2015
6. EPIET module on Time Series Analyses, 23-27 November 2015
7. EPIET Vaccinology Module, Paris 16-20 May 2016
8. EPIET RAS module, Athens 20-26 June 2016
9. EPIET Project Review Module, Lisbon, 22-26 August 2016

7. Other activities

Additional training

1. Completed the on-line LSHTM course 'Ebola in Context: Understanding Transmission, Response and Control' 19th-30th January 2015 http://www.lshtm.ac.uk/study/freeonlinecourses/ebola/

2. Completed UNDSS online courses on Basic and Advance Security in the field
3. Attended and presented at Mini Project Review meeting, Birmingham, United Kingdom, 7th-8th May 2015
4. Completed ECDC on-line pilot course on Abstract writing
5. Attended a Regional Outbreak Training Exercise organised by the Food Safety Authority of Ireland, in Tullamore, Ireland on April 15th2015
6. Completed half day training session at HPSC for National Clinical Effectiveness Guideline Development given by National Clinical Effectiveness Committee (NCEC) staff from Irish Department of Health and Children, October 2015
7. Completed EpiConcept course "Using Stata to analyse surveillance data", at HPSC offices December 14-18th 2015
8. Attended half day NCEC training on 'Searching for clinical evidence' at HPSC January 7th 2016
9. Completed two day Lab4Epi course at Public Health England, Colindale, January 19-20th 2016
10. Completed on-line training with Demographix for online survey questionnaire tool, February 4th 2016. https://www.demographix.com
11. Attended and presented at Mini Project Review module, Belfast, March 3-4th 2016
12. Completed Irish Department of Health one-day course on Developing evidence based clinical guidelines, May 5th, 2016
13. Completed Demographix online 'Analysis and Reporting' Training Session, June 8th 2016

Conferences attended

1. Attended ESCAIDE November 5th-7th 2014
2. Attended Ebola Conference, Mater Misericordiae Hospital, Dublin November 12th 2014 http://www.hpsc.ie/A-Z/Vectorborne/ViralHaemorrhagicFever/Ebola/TrainingResources/MaterEbolaConference/
3. Attended EAN workshop 'Anthropology for Outbreak Investigations' London, United Kingdom, 18th-19th May 2015
4. Attended and gave oral presentation at ESCAIDE 11-13th November 2015
5. Attended the Princeton-Fung Global Forum: Modern Plagues: Lessons Learned from the Ebola Crisis. November 2-3, 2015 at University College Dublin Dublin, Ireland
6. Attended and gave invited oral presentation at the Safefood workshop 'Controlling Foodborne Viruses', December 2015l, Dublin
7. Attended and presented two posters at the Irish Faculty of Public Health Medicine Winter Scientific Meeting, December 9th 2015
8. Attended and gave oral presentation at Irish Society of Clinical Microbiologists Spring Meeting, 27th February 2016
9. Attended and presented a poster at EASL ILC, Barcelona, Spain, April 13-17th 2016
10. Attended and gave oral presentation at Five Nations Public Health Conference, Cardiff, UK, May 9-11, 2016
11. Attended and gave oral presentation Infectious Disease Society of Ireland annual meeting, Dublin, May 13-14, 2016.
12. Attended and gave oral presentation at Royal College of Physicians in Ireland, Faculty of Public Health Medicine Summer Scientific Meeting, Dublin, May 31-June 1, 2016

Other

1. Attended EPIET Training Site Forum, Stockholm November 4th 2014 in cohort representative capacity
2. Gave 'My Research' Interview for *Safe*food Network Newsletter, November 2015
3. Attended ECDCs 3rd Hepatitis B and C Network Meeting 16 – 18 February 2015.
4. Reviewed a paper for the journal 'Foodborne Pathogens and Disease', April 2015
5. Reviewed a paper for the journal 'Epidemiology and Infection' March 2016
6. Attended EPIET Training Site Forum Stockholm 21-22nd April 2016 in cohort representative capacity
7. Interviewer for MSF needs assessment survey in Elliniko refugee camp in Athens, June 25th 2016

Supervisor's conclusions

Patricia has had a very successful 2 year Fellowship. She has worked extremely hard and efficiently and has completed many projects that have important implications for public health in Ireland and

internationally. In this work she has achieved a high level of competence in all the required domains. She has made a very important contribution to the knowledge of hepatitis C in Ireland by a research project to establish the seroprevalence of hepatitis C using residual sera. Patricia led this project including the initial research, preparation of project protocol, successful ethics application, negotiations with external partners, overseeing of laboratory methods, analysis of data and preparation of final report and paper for publication (to be completed by end of Fellowship). Having led the epidemiological investigation of a hospital-based outbreak of MRSA, the findings of the investigation have directed the actions to be taken by the hospital to prevent further such episodes. She also led the epidemiological investigation into a foodborne outbreak in the South of the country. An important surveillance project undertaken by Patricia was the implementation of enhanced surveillance for hepatitis E and this included design of the surveillance system and negotiations with external public health partners. The project Patricia carried out on HIV PEP knowledge among healthcare workers will inform initiatives to improve knowledge among these staff through teaching and information campaigns. Her work has always 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. During her Fellowship, Patricia has supported the work of others in HPSC by advising others on research, by presentations at journal club meetings and by organising a monthly in-house training and research meeting. She has also participated in teaching sessions for undergraduates and post-graduates both in HPSC and externally.

Coordinator's conclusions

During her EPIET fellowship, Patricia was involved in a wide range of public health relevant projects, undertook an impressive amount of work, and achieved a large amount of outputs. She was able to work independently and effectively and delivered high quality work. She was highly motivated and always focused on achieving the goals of the projects she was involved in. Although her competencies at the beginning of her fellowship were at high level, she managed to further enhance her capacities and improve considerably her epidemiological skills. Despite having considerable experience in field epidemiology before she started the fellowship, she demonstrated a positive attitude towards scientific review and she was always ready to accept constructive criticism. The latter suggests that EPIET is also suitable for senior public health professionals with an open spirit who are willing to improve their skills. Many of Patricia's projects have important public health implications not only in Ireland, but also internationally. I believe that Patricia is committed to field epidemiology and has considerable professional skills for any epidemiological and public health related work, both at national and international level. She has become an excellent field epidemiologist.

Personal conclusions of fellow

I highly recommend the EPIET programme, in particular to current members of the EU public health workforce who want to undertake the MS-track. I have learned many new skills through the modules, which were re-enforced by applying them subsequently to practical study questions. I have had opportunities to broaden my understanding of the epidemiology of a wider range of infectious diseases, and of the study designs and methods appropriate to their epidemiology and knowledge gaps. I also got the opportunity to lead on several projects. I am particularly proud of contributing to the HCV seroprevalence study as it will provide data which will contribute the HCV screening policy in Ireland, to contributing to the set-up of enhanced surveillance for HEV, of undertaking the times series analyses on VTEC notification data, and of devising the hypothesis generation tool for foodborne outbreak investigation, the outputs from which I believe will have public health impact. I engaged with many other organisations and individuals involved in public health in Ireland and the EU which enriched my experience, and got to present widely the findings of the studies on which I worked during the fellowship. I also feel very privileged to have been able to contribute in a very small way to the MSF needs assessment survey in Elliniko refugee camp in Athens, June 25th 2016 by acting as interviewer, a humbling learning experience.

Acknowledgements

I am immensely grateful to my supervisor Dr. Lelia Thornton who is a great mentor, has a precise yet pragmatic approach to epidemiological study design and implementation, and has encouraged my self-

reliance. I am also grateful to our former HPSC director Dr. Darina O'Flanagan for her commitment to the EPIET programme, providing me with 100% protected time to work on EPIET-related projects, in order that I might gain the most possible from the programme. Thanks also to Dr. Kevin Kelleher for support for travel and attendance at additional conferences and training during this time, which has supplemented my experience. I also wish to thank the HPSC Gastrointestinal team members who covered additional surveillance work in my absence from normal duties (Dr. Margaret Fitzgerald (cohort 2012), Sarah Jackson, Fiona Cloak and Dr. Paul McKeown).

Thanks to external study partners in NVRL, the Department of Public Health HSE-South, the statistics unit in Public Health England, the National VTEC Reference Laboratory, the Food Safety Authority of Ireland, Beaumont Hospital, and the HSE Sexual Health and Crisis Pregnancy Programme, with whom I collaborated during my projects. Thanks to EASL for funding attendance at the EASL conference 2016 in Barcelona, and to Safefood for funding attendance at the EAN workshop entitled 'Anthropology for Outbreak Investigations' in London, May 2015.

Thanks to the EPIET co-ordinators, especially Dr. Marion Muehlen (EPIET programme head) and Dr. Yvan Hutin (former EPIET programme head), and other facilitators/instructors on the modules -all individuals who are truly dedicated to the EPIET programme. Thanks to the other EPIET/EUPHEM/EAP fellows in my cohort (and in adjacent cohorts) who enriched my fellowship (both academically and socially). To my office mates, Dr. Jolita Mereckiene (cohort 2005), Coralie Giese (cohort 2013) and Katerina Chaintarli (cohort 2015), who made our office a very supportive and engaging environment in which to work. And to my EPIET frontline co-ordinator, Dr. Kostas Danis, who was constantly available for advice (even while he was on leave), who has amazing skill and patience in explaining difficult epidemiological concepts, and who consistently encouraged me to strive for improvement in my epidemiological and communication skills.

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