Fellowship summary report 19/08/2016

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Background

Pre-fellowship short bio

Prior to starting my fellowship I was a Senior Epidemiological Scientist at the Public Health Agency (NI) with responsibility for the daily management of the surveillance of Healthcare Associated Infections (HCAI) and Anti-microbial Resistance (AMR). I was also an honorary research fellow at the UKCRC Centre of Excellence for Public Health, Queen's University Belfast. I have a BSc Biological Sciences (1st class, 2003), a PhD from the School of Biological Sciences (2007), both Queen's University Belfast, and an MSc Epidemiology from the London School of Hygiene and Tropical Medicine (2014).

FETP assignment

I was a member of Cohort 2014 and I was based in Belfast at the Public Health Agency.

During my fellowship I have gained experience of, outbreak investigation: both gastro-intestinal and respiratory; surveillance: setting up a system to monitor antimicrobial resistance of gonorrhoea isolates, describing the epidemiology of new HIV diagnoses in NI, evaluating device associated infection surveillance in intensive care units in NI, and the analysis of enhanced surveillance data for Pneumocystis pneumoniae; research: a survey to describe people who inject image and performance enhancing drugs in NI and a data linkage project to examine antibiotic prescribing in the elderly, with a specific focus on those who reside in care homes. I also had the opportunity to present my work as either poster or oral presentations at scientific conferences. I have taught about surveillance and outbreak investigations on a MSc Public Health course. As well as building competence on the job, I have gained new knowledge during the training module; this includes time series analysis, environmental epidemiology and vaccinology.

All of the projects that I completed during my fellowship arose because of a service need and so in additional to my personal development it is extremely rewarding to know that the work I completed will make a difference.

Fellowship projects

Outbreak(s)

1. Report of the epidemiological investigation of an outbreak of enteric illness amongst individuals who attended a christening in the Western area of Northern Ireland, November 2014

Introduction

On 19th November 2014, the Public Health Agency was notified by Western Group Environmental Health of two potential enteric outbreaks in the previous week in the Western Trust area of Northern Ireland. Early food chain investigations showed that cake from the same bakery had been supplied to both events (bakery-cake).

Methods

We carried out a cohort study with the christening guests to test the hypothesis that consumption of bakery cake at the christening was associated with an increased risk of illness.

All cases were asked to submit stool samples to test for bacterial and viral pathogens. Samples of the bakery-cake were sent to the NI Public Health Laboratory (NIPHL) for bacteriology testing and Public Health England (PHE; Colindale) for viral pathogen testing. No environmental samples were taken.

Results

32 of the 34 guests completed a questionnaire; 17 cases were identified. The median age of cases was 41 years and 10 (59%) were female. All presented with mild illness within 24-48 hours of exposure. In the univariate analysis, bakery-cake (odds ratio (OR) 19.73, 95% CI 2.6-∞) and a cake produced by a guest were associated with an increased likelihood of illness (OR 7.1, 95% CI 0.8-∞). Several other items were also associated with illness. A model which adjusted for all the food items at once was unable to disentangle the effect of the bakery-cake and the cake produced by a guest.

One stool sample was positive for Norovirus and negative for bacteriology. Norovirus was not detected in the cake sample.

Discussion

The causative agent for the outbreak is likely to be Norovirus. While the vehicle of the outbreak could not be determined through the analysis the results suggest that more than one food type may have been responsible.

Tasks undertaken personally:

Participated in the OCT; developed a protocol; conducted descriptive analysis (time, place, and person); developed and tested the hypothesis (cohort study; uni-variable and multi-variable analysis); interpreted the epi data in the context of microbiology and environmental investigations; developed recommendations for future outbreak investigations; produced an Epi report.

Outputs

Outbreak report – shared with the OCT

2. Outbreak of Invasive Pneumococcal Disease at a Belfast shipyard in men exposed to welding fumes, April – May 2015

Introduction

On 29th April 2015, Public Health Agency (PHA) was notified of two cases of invasive pneumococcal disease (IPD) in men who worked on an oil rig refurbishment at a Belfast shipyard. There were no other epidemiological links. On 13th May, these cases were identified as serogroup 4 and two further cases of IPD were reported linked to the rig. PHA convened an outbreak control team.

Methods

PHA arranged clinics during 16th-18th May to offer antibiotics (azithromycin or amoxicillin) and 23-valent-pneumococcal polysaccharide vaccine (PPV) to workers at highest risk (those working on the rig and exposed to metal fumes).

Results

680 individuals attended the clinics; 96% received antibiotics and 93% PPV. Staffing at clinics included public health doctors, pharmacists, and Trust nurses. As around 30% of the workforce did not speak English interpreters for Polish, Lithuanian, and Russian languages were needed daily. 4 symptomatic workers identified at the clinic were referred for assessment at the Emergency Department. Workers were employed by multiple contractors with very limited onsite occupational health support available to the incident. The majority of workers were not registered in local primary care.

Discussion

This was a challenging response to an outbreak in a large multinational workforce. Health protection plans should include prescribers, vaccine administrators, pharmacists and interpreters. Consideration should be given to arrangements for onsite clinical assessment of symptomatic workers identified in clinics, particularly in a population with limited access to primary care. Close liaison with shipyard management at all stages of risk assessment and response was key.

Tasks undertaken personally:

Participated in the OCT; performed literature search; developed a questionnaire; lead scientific aspects of epi investigation; developed a database; supported the on-site clinics; conducted descriptive analysis (time, place, and person); developed recommendations; published rapid communication; write article for Transmit (Health Protection report); contributed to writing a second manuscript; submitted an abstract; gave an oral presentation.

Outputs

- Rapid communication – Eurosurveillance (first author)
- Transmit article - PHA Health Protection report – published online (first author)
- Oral presentation – 5 Nations 2016 (first author)
- Manuscript in progress (co-author)

Surveillance project(s)

1. Implementation of the European Gonococcal Antimicrobial Surveillance Programme (Euro-GASP) in Northern Ireland, October 2014 - September 2016

Introduction

Gonorrhoea has been identified as at risk of becoming an untreatable disease due to the emergence of antimicrobial resistance (AMR) to successive antibiotics. The European Gonococcal Antimicrobial Surveillance Programme (Euro-GASP) was established to monitor *N. gonorrhoeae* AMR in the EU/EEA. The aim of this project was to establish NI participation in Euro-GASP to allow the Public Health Agency (PHA) to monitor trends in susceptibility in gonococcal isolates to selected antibiotics.

Methods

A standard operating procedure was drafted and agreed with the Royal Victoria Hospital laboratory staff, GUM clinic staff and Public Health England microbiology and surveillance colleagues. A questionnaire was developed, in collaboration with the GUM clinic, to collect epidemiological data to support the microbiological evidence.

Results

The surveillance programme was successfully established in November 2014. Two periods of data collection have been carried out: November 2014 – January 2015 and October – December 2015. The surveillance system was established with the following attributes in mind:

- Simple – the system will be simple in structure and easy to operate
- Flexible – the system will be able to respond to changing information needs
- Acceptable – the system will be acceptable to the PHA STI surveillance team, the Royal Victoria Hospital laboratory and the Belfast GUM clinic.

Discussion

Completion of this project has ensured that a surveillance programme for antimicrobial susceptibility in gonorrhoea was established in Northern Ireland. In the future, the data collected will provide baseline information on the epidemiology of gonorrhoea infections in NI. This will allow comparison between NI, GB and Europe and will inform future treatment guidelines in Northern Ireland.

Tasks undertaken personally:

Designed the surveillance system: described the public health importance of gonorrhoea, the existing surveillance system, objectives of the new system, key attributes, sources of information, outputs, roles and responsibilities; obtained support from RVH laboratory, GUM clinicians and PHE staff (collaboration); agreed an SOP and questionnaire for epidemiology data collection; supervised the development of an access database; entered data; advised PHA HIV/STI surveillance team about future participation.

Outputs

- Protocol – for PHA / GUM clinicians / RVL laboratory staff / PHE microbiology colleagues

- Euro-GASP surveillance overview document – PHA internal report
- Euro-GASP epidemiology questionnaire – GUM clinicians

2. Enhanced surveillance of recently acquired new HIV diagnoses in Northern Ireland.

Introduction

In November 2014, Genito-urinary medicine (GUM) clinicians reported there had been an increase in the number of new diagnoses of HIV which are recently acquired, as identified through RITA. The aim of this project is to identify the feasibility of a targeted intervention to reduce the acquisition of HIV in NI.

Methods

All new HIV diagnoses between July 2014 and January 2015 with a positive RITA were identified. An enhanced surveillance proforma was designed to collect information on patient information, clinical details, likely acquisition and sexual contacts. The proforma was completed for all cases by GUM clinical staff of the regional HIV service.

Results

16 individuals met the case definition, 14 identified as MSM. The analysis focussed on these individuals only. The median age was 27.5 (range 19 – 52 years). 71% (10/14) were aged 19-29. The majority were NI residents and all were white ethnicity. 93% (13/14) had a previous negative HIV test and 11 of these (84.6%) were within 24 months. Four individuals presented with clinical symptoms, only one of which was a seroconversion illness (4/14, 28.6%).

Discussion

The high proportion of individuals who have had a negative HIV test within 2 years of diagnosis suggests individuals are aware of the risks and of the advice to get tested. This suggests that current safer sex messages are not being effective. While 80% of HIV positive individuals will experience a seroconversion illness only one case presented with signs of a seroconversion illness. This suggests a potential lack of awareness of the clinical features of seroconversion illness among patients.

Tasks undertaken personally:

Described the public health importance of new HIV diagnoses; obtained support from GUM clinicians; agreed a questionnaire for data collection; designed epi-data questionnaire; completed data entry; performed descriptive analysis (time, place, person); produced a report; identified conclusions and recommendations.

Outputs

- Surveillance report – shared internally and with GUM clinic

3. Evaluation of the surveillance of device-associated infections acquired in critical care units in Northern Ireland, February 2011 – December 2014.

Introduction

In 2011, surveillance of healthcare associated infections in critical care units (CCU) was implemented in Northern Ireland using a European protocol. Information on bloodstream infections (BSI) including catheter-related BSI (CR-BSI), a quality of care indicator, is collected using a clinical information system 'WardWatcher' which combines human and catheter isolate information. The aims are to monitor trends in nosocomial infections and facilitate comparisons between units. We aimed to evaluate completeness of the system and the surveillance report utility.

Methods

We defined a BSI as a positive blood culture sampled from day 3 of admission onwards; and a CR-BSI as a BSI and culture-positive catheter in a patient with signs and symptoms of systemic infection. We quantified reporting completeness comparing BSI from: 1) WardWatcher and; 2) CoSurv (regional human isolate database) linking datasets using a national unique number, date of birth and CCU identifier, and calculated CR-BSI/BSI proportion. We assessed adherence to protocols and perception of report utility through a survey of microbiologists and intensivists.

Results

51 BSIs (19 CR-BSI (37.2%)), were reported through WardWatcher compared with 312 reported through Co-Surv. The CR-BSI/BSI proportion was 19/312 (5.9%) compared with a European average of 36.7%. 4/5 microbiologists and 8/9 intensivists responded to the survey. All microbiologists but only 1/8 intensivists adhered to European case definitions. Surveillance report use included within unit and between unit comparisons.

Discussion

There is significant underreporting of BSI in WardWatcher and possible under-reporting of CR-BSI, which as a measure of care quality should be captured. There is evidence of variation in the application of surveillance case definitions. We propose training to improve compliance with the protocol and on-going monitoring of reporting completeness.

Tasks undertaken personally:

Described the public health importance of CR-BSI; described the system; chose CDC attributes to evaluate; designed questionnaires; piloted questionnaires with a microbiologist and ICU clinician; collaborated with multiple stakeholders – PHA HCAI surveillance team, intensivists, microbiologists, laboratory staff; designed epi-data database; entered data; linked data; analysed data; produced a report; identified conclusions and recommendations; disseminated findings.

Outputs

- Surveillance evaluation protocol
- Surveillance evaluation report
- Poster presentation – ESCAIDE 2015 (first author)

4. Analysis of enhanced surveillance of Pneumocystis jirovecii laboratory notifications in Northern Ireland, 1st July 2011 – 31st July 2012

Introduction

Since 2011, clinicians in Northern Ireland (NI) have reported concerns of an increase in Pneumocystis pneumonia (PCP) in non-HIV patients. Guidelines for antibiotic prophylaxis exist for HIV patients but there is a lack of consensus for non-HIV patient groups. Enhanced surveillance for P. jirovecii was introduced in Northern Ireland (NI) during 2011 in response to an outbreak of PCP in renal patients. The aim of this project was to analyse the enhanced surveillance data in order to describe the epidemiology of PCP compared to P. jirovecii colonisation in NI with a view to informing preventive measures.

Methods

From July 2011 to July 2012, we collected information on demographics, clinical severity (including 30 day all-cause mortality) and clinical features for all hospital inpatients in NI aged ⩾18 years with P. jirovecii confirmed in any respiratory tract sample (upper and lower). We defined PCP or P. jirovecii colonisation according to clinical symptoms and radiological findings. We statistically described PCP and P. jirovecii colonisation and calculated the adjusted median unbiased estimate (AMUE) of the odds ratio (OR) using multivariable exact logistic regression, adjusting a priori for age and sex.

Results

36/49 (73%) of P. jirovecii detections were PCP; median age of detections was 65 years (range 24-86) and 78% were male. 28/36 (78%) were in non-HIV patients, of which 18 (64%) had cancer. 29/36 (81%) had 3 or more aetiological causes of immunosuppression. 30 day all-cause mortality for cancer patients was 42% compared with 13% for HIV patients (P-value=0.21). The odds of PCP, compared to P. jirovecii colonisation, increased with exposure to chemotherapy (AMUE OR 8.73; 95% confidence interval (CI) 0.84, ∞), immunosuppressive drugs (AMUE OR 12.1; 95% CI 1.94, ∞) and an HIV diagnosis (AMUE OR 16.2; 95% CI 1.71, ∞).

Discussion

We observed the greatest burden of PCP in cancer patients. Exposure to chemotherapy and immunosuppressive treatment were identified as independent risk factors. Several recommendations arose as a result of this study including increasing clinician awareness of PCP risk in non-HIV patients, and promoting the consideration of prophylaxis on a case by case basis. We propose further research to characterise cancer patients who may benefit from prophylaxis.

Tasks undertaken personally:

Described the public health importance of PCP; literature search; collaborated with Royal Victoria Hospital Virology scientists and clinicians; agreed case definition; agreed risk factors; cleaned data; analysed data (multivariable analysis); produced a report; identified conclusions and recommendations; disseminated findings.

Outputs

- Enhanced surveillance analysis protocol
- Enhanced surveillance analysis Report

- Poster presentation – ESCAIDE 2016 (first author)
- Poster presentation – Federation of Infection Societies (FIS) Annual Conference and the 10th Healthcare Infection Society (HIS) International Conference 2016 (first author)

Research

1. A survey of people who inject image and performance enhancing drugs in Northern Ireland

Introduction

The risk of BBV is recognised in people who inject psychoactive drugs and interventions around safe injecting practice, testing and vaccination are well understood. What is less clear is how this risk translates to the population of people of people who inject image and performance enhancing drugs (IPEDs). The aim of this survey was to characterise the IPED population in Northern Ireland with a view to informing intervention measures.

Methods

Any individual who attended a needle and syringe exchange service (NSES) in NI and injected IPEDs, such as, anabolic steroids and melanotan during the period 1st November 2016 to mid-February 2017 was invited to participate in the study. Individuals were asked to complete a short questionnaire to characterise risk behaviours and knowledge of risks surrounding IPED use.

Results

The analysis was restricted to 101 male IPED users. The median age was 30 years and the majority were born in the UK. Three individuals (3%) reported sharing needles and syringes and two had also shared vials. Nine (9%) reported experiencing side effects in the last year with one individual seeking health care. 16 individuals (16%) identified having redness, tenderness, swelling or an abscess at the injection site in the previous year. Almost 80% had not received tests for Hepatitis B, C and HIV. 17 individuals (17%) had been vaccinated for Hepatitis B. Only three individuals felt uninformed about the effects and side effects of IPED with one individual feeling uninformed about safe injecting practice.

Discussion

The prevalence of needle sharing was low in this population. Testing for Hepatitis B, C and HIV and Hepatitis B vaccine uptake was low and should be improved. The NSES has a key role in targeting this hard to reach population who may not want to disclose their IPED use to other healthcare professionals.

Tasks undertaken personally:

Identified a problem of public health importance; reviewed literature; chose the study design and study population; chose appropriate methodology; developed a plan of analysis; wrote a detailed protocol; obtained financial support; assessed the need for ethics; collaborated with stakeholders – PHA Health Improvement, HSCB Pharmacy, PHE BBV team; recruited NSES; conducted a pilot study and made modifications; trained staff on study materials; updated the study team (health improvement, PHA and pharmacy colleagues); amended and updated a questionnaire based on feedback; collected and analysed data (descriptive: person, place, and time); interpreted the results; identified plans for dissemination of results/lessons learned.

Outputs

- Guidance document for pharmacies – shared with NSES in NI

- Information sheets for participants
- Research study protocol
- Research report

2. Antibiotic prescribing in older people and trends on movement into institutional care: a record linkage study.

Introduction

Antibiotic prescribing in nursing homes is now seen as a global problem contributing to antimicrobial resistance. Northern Ireland nursing homes have the third highest level of prescribing in Europe. The aim was to examine if the risk of antibiotic prescribing increases on admission to a care home.

Methods

This was a population-based data-linkage study using prescription drug information from a centralised prescribing database (EPD - Enhanced Prescribing Database which is maintained by the Business Services Organisation (BSO)). The study period was 1st January 2012 – 31st December 2013. The study population included all people aged 65 years and over registered with a GP in N. Ireland. Exclusions varied according to the specific objectives. The main outcome was the number and duration of antibiotics dispensed to each individual, using individual level DDDs for all antibiotics, provided on a monthly basis.

What this study adds

This study will provide empirical evidence about: 1) the respective prevalence and quality of prescribing of antibiotics to individuals aged 65 years and over in the community and care homes, by type of care home; previous studies have focussed on nursing homes; 2) the likelihood of being prescribed an antibiotic adjusting for other factors and quantification of how much of the variation can be attributed to GP practices or care homes; 3) the change in prevalence and quality of antibiotic prescribing on entry to a care home.

Tasks undertaken personally:

Identified a problem of public health importance; reviewed literature; identified and wrote the research question and hypotheses to be tested; chose appropriate methodology; developed a plan of analysis; wrote a detailed protocol; attended REC meeting and obtained ethical approval (National Research Ethics Service (NRES)); obtained Honest Broker Service (HBS) Governance approval; recruited a study team with representatives from academia, pharmacy (academia and service), statistical support and HP consultants; provided updates to the study team; agreed the dataset with HBS; analysed the data (multivariable analysis); interpreted the results.

Outputs

- Research study protocol
- NRES Ethics application
- HBS Research Application

Scientific communication

- Three posters; two at ESCAIDE (2015 and 2016) and one at FIS/HIS (2016)
- One oral presentation (5 Nations Health Protection Conference 2016)

- One manuscript (rapid communication Eurosurveillance)
- 2 manuscripts currently being drafted – PCP / IPED
- 1 manuscript planned – antibiotic analysis

Teaching experience

1. I taught two sessions on the Queen's University Belfast MSc Public Health both in 2015 and 2016.

    a. Communicable Disease Surveillance Lecture (90 minutes). This consisted of theory and practical examples to encourage interaction with the students. The objectives were to: Define surveillance; Describe characteristics of a surveillance system; Interpret surveillance information; Identify public health recommendations on the basis of surveillance information. After the lecture I issued an evaluation to the students and produced a reflective note.

    b. Trichinosis Case study – Outbreak Practical (90 minutes). I adapted the Trichinosis case study specifically for this group. The objectives were to: 1. Describe the steps in an epidemic investigation; 2. Develop a case definition in the context of an outbreak investigation; 3. Interpret an epidemic curve; 4. Choose an appropriate control group for case control study 5. Interpret an odds ratio; 6. Have an understanding of public health control measures. In 2015, I investigated the knowledge and experience of the students using a pre-lecture/case study online learning needs assessment (LNA tool). I also evaluated the lecture and produced a reflective note.

2. In July 2015, I delivered a lecture on "Epidemiology and Public Health" to a group of students doing a post grad diploma in health and social care management. The objectives were to: Define epidemiology; Calculate disease prevalence and incidence; Identify types of epidemiological studies and; Describe the role of epidemiology in public health. I used both theory and practical examples.

3. Journal club lead - within this role I organised speakers for each session, gave advice on the choice of journal article / tools to assist with review and sent reminders about sessions. I also participated as a reviewer.

4. I planned, organised and evaluated the Mini Project Review module (March 2016). I agreed a suitable date for the mini module with the FETP programme office; I identified and managed the resources needed for the module including: agreeing the budget, identifying a venue and organising rooms / catering; I collaborated with fellows to get their presentation topics and prepared an agenda for the 2 days; I identified the needs of the fellows and recruited internal and external experts with specialist knowledge to facilitate at specific sessions; I carried out an evaluation; I provided recommendations to FETP programme office for future MPR.

5. I organised a CPD session for all Health Protection staff on the role of Geographical Information Systems (GIS) in health. This included identifying an external speaker, agreeing dates, and advising about possible ideas for the presentation informed by my view of what the knowledge gaps were.

International mission(s) [If applicable]

N/A

Next steps

I will return to my role as a Senior Epidemiological Scientist working with Healthcare Associated Infections and Anti-microbial Resistance. I will also continue my secondment as an Honorary Research Fellow at the UKCRC Centre of Excellence for Public Health, Queen's University Belfast.

I plan to apply for the multi-disciplinary route for the Faculty of Public Health Specialty Registrar training when the programme opens in Northern Ireland.

My goal is to be a Consultant Epidemiologist and Honorary Senior Lecture at the Centre of Excellence.

References - List of the publications and communications

Manuscripts

Patterson L, Irvine N, Wilson A, Doherty L, Loughrey A, Jessop L. Outbreak of invasive pneumococcal disease at a Belfast shipyard in men exposed to welding fumes, Northern Ireland, April–May 2015: preliminary report. Euro Surveill. 2015;20(21):pii=21138. Available online: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=21138

Conferences

1. Patterson L, McIlvenny G, Geoghegan L. Adherence to protocols should be reinforced after a surveillance evaluation shows underreporting of bloodstream infections and variation in the application of definitions in Northern Ireland adult critical care units during 2011 – 2014. Poster presentation, ESCAIDE 2015.
2. Patterson L, Irvine N, Ewing J, Wilson A, Johnston J, Doherty L, Loughrey A, Jessop L. Men at work- An outbreak of serious pneumococcal disease in a multinational workforce of men exposed to welding fumes at a Belfast shipyard. Oral presentation, 5 Nations Health Protection Conference 2016.
3. Patterson L, Coyle P, Curran T, McAnearney S, Johnston J. A higher prevalence of Pneumocystis pneumonia is observed in non-HIV patients, particularly those with cancer, in Northern Ireland, July 2011 – July 2012. Poster presentation, ESCAIDE 2016.
4. Patterson L, Coyle P, Curran T, McAnearney S, Johnston J. Similar outcomes for individuals colonised with Pneumocystis jirovecii and those with Pneumocystis pneumonia (PCP) in Northern Ireland; should we decolonise? Poster presentation, FIS/HIS 2016.