



## EPIET REPORT

# Summary of work activities

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

## Background

### Pre-fellowship short biography

Prior to EPIET, Carlos Carvalho, a qualified public health medical specialist in Portugal, had been working in health protection both at the local and regional levels since 2005. During this period he had gained experience in surveillance, health planning, health protection and environmental health.

### EPIET assignment

On 19 September 2011, Carlos Carvalho was assigned to the Health Protection Services Colindale, Health Protection Agency, London, United Kingdom. Activities developed included the surveillance of a wide range of infectious diseases, developing and implementing applied research projects, responding to outbreaks and training colleagues and other professionals.

## Fellowship projects

### Surveillance project

#### **UK Severe Influenza Surveillance System (USISS) – mandatory reporting evaluation 2011/2012<sup>1,2</sup>**

**Background:** Following the 2009 pandemic, the Health Protection Agency (HPA) developed the UK Severe Influenza Surveillance System (USISS), based on mandatory weekly reports of admissions to Intensive Care/High-Dependency Units (ICU/HDU) throughout the UK. During 2011 and 2012, ICU/HDUs from 164 acute hospitals in England submitted weekly data and national reports were produced every Thursday. We evaluated the system in order to inform future surveillance plans.

**Methods:** We surveyed participating acute hospital trusts in England online to collect feedback about structure, operation and outputs of USISS. We requested data tables for the weeks 40/2011 to 20/2012 summarising cases (persons admitted to ICU/HDU with laboratory-confirmed influenza A[H1,H3,novel] or B infection during the previous week) in order to validate reports already received.

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Results: A total of 35 USISS users (21%) responded to the survey. In all, 60% considered the data requested reasonable, 60% agreed that USISS would make it possible to identify a novel virus, 52% judged resources available in the ICU/HDU sufficient to participate in USISS and 29% received adequate feedback.

Of the 244 cases initially reported, 133 (55%) were influenza A unknown subtype, 67 (27%) A(H3N2), 25 (10%) A(H1N1)2009 and 19 (8%) influenza B. We received validation tables from 42 ICU/HDUs (26%) totalling 68 cases (versus 87 cases initially sent to HPA). Five (13%) were updated from 'unknown' to a specific subtype and 19 (22%) were discarded after reporting.

Conclusions: In 2011/2012, USISS was well accepted and considered useful. While all known cases were reported, some sub-typing data were missing. The low numbers of severe influenza cases in selected ICU/HDUs may explain the lower response and completeness of the evaluation surveys. HPA must improve feedback to ICU/HDUs and re-evaluate the system during a high-activity influenza season.

Status: Completed (oral presentation at ESCAIDE 2013).

### **HPA Olympics Surveillance Work-Stream Group – Public health surveillance**

Integrated the HPA Colindale situation report production team. Prepared factsheet about Legionnaires' disease for the London Organising Committee of the Olympic and Paralympic Games (LOCOG).

Status: Completed.

### **Hepatitis A surveillance in the UK: national audit on minimum dataset**

Involved in the national audit on the minimum dataset to support hepatitis A surveillance in the UK, identifying and reviewing the best available evidence on the epidemiology of hepatitis A to support minimum data collection on hepatitis A cases by Health Protection Units (HPU).

Status: Completed.

## **Outbreak**

### **Sporadic hepatitis A associated with sun-dried tomatoes in England, July–December 2011<sup>3,4,5</sup>**

Background: In October 2011, the Health Protection Agency (HPA) in England received three reports of hepatitis A in persons who had eaten sun-dried tomatoes (SDT) with genotype Hu/Netherlands/RIVM-006/2010 (SDT-strain, previously associated with SDT in the Netherlands, N=2) and another related strain (N=1). Both genotypes were also closely related to one observed in a large outbreak in Australia (2009), also associated with SDT consumption. We investigated to examine the association between SDT consumption and sporadic hepatitis A cases of (a) all genotypes and (b) SDT-strain.

Methods: We compared (a) sporadic laboratory-confirmed primary hepatitis A cases without travel history with *Campylobacter* controls (case-control) and (b) SDT-strain cases with other/untyped strains (case-case). We collected food consumption histories through mailed questionnaires and calculated age and sex-adjusted odds ratios (OR) in logistic regression.

Results: From July to December 2011, 43 sporadic hepatitis A cases were reported. Eighty-six controls were assigned. Forty-two percent of cases and 38% of controls responded to questionnaires. Of nine cases with genotyping results, three were the SDT-strain. Sporadic hepatitis A cases did not significantly differ from *Campylobacter* controls in terms of SDT consumption (6/14 versus 5/27; OR=3.3; 95% Confidence Interval (CI): 0.6-18). The three SDT-strain cases, however, were more likely than the twelve other/untyped strains to have eaten SDT sold loose (3/3 versus 2/12; adjusted OR=14; 95% CI: 1.2-∞).

Conclusions: Genotyping and epidemiological investigations pointed to SDT as a cause of sporadic hepatitis A in the Netherlands and in England. However, multiple strains and a small number of cases prevented the identification of a precise source. Surveillance for SDT-associated hepatitis A must continue in Europe to identify a source that can be recalled/prevented.

Status: Completed. (one article and two conference presentations).

### **Salmonella Typhimurium DT30 outbreak in the UK**

Led the investigation, supervised by Bob Adak (Gastrointestinal, Emerging and Zoonotic Infections (GEZI) department). Wrote investigation protocol, developed and administered trawling questionnaires for hypothesis generation and testing. Produced and shared internal investigation report with the GEZI department.

Status: Completed

## Novel coronavirus 2012

Member of the incident control team, responsible for the data management of cases and contacts under investigation.

Abstract<sup>6</sup>: On 22 September 2012, a novel coronavirus, very closely related to that from a fatal case in Saudi Arabia three months previously, was detected in a previously healthy adult transferred to intensive care in London from Qatar with severe respiratory illness. The patient was placed in strict respiratory isolation. Ten days after last exposure, none of the 64 close contacts had developed severe disease, although 13 of them (20.3%) reported mild respiratory symptoms. The novel coronavirus was not detected in 10 of 10 symptomatic contacts tested.

Status: Completed (co-author in three articles<sup>6,7,8</sup>)

## *Salmonella* Typhimurium DT193, Hepatitis E, Cryptosporidium

Included in the investigation teams for these outbreaks, providing support for analytical epidemiology (case-control studies).

Status: Completed.

## Research

### Pertussis in England: different vaccine, different risk?<sup>9</sup>

Background: Acellular pertussis vaccines (aP) were introduced into the childhood immunisation programme in England and Wales in 1999, replacing whole-cell vaccine (wP) for primary course (PC) in October 2004. In 2001, a pre-school booster (PSB) at the age 3–5 years with three- (aP3) or five- (aP5) component pertussis vaccine was included, affecting children born after 1997. Despite the high pertussis vaccination coverage over the last two decades (96% at 24 months and 87% at five years of age in 2011/2012), 9 397 cases were reported in England in 2012. A total of 1 459 (16%) were between 10 and 19 years old and 76% above that age. We aimed to compare protection provided by different vaccines.

Methods: We conducted a case-control study. Cases were born between 1997 and 2006 and had completed the recommended four-dose vaccination schedule in England, before having laboratory-confirmed pertussis (from January 2011 to December 2012). Controls were identified from the Child Health Information System (CHIS), representing 20% of the English population. We calculated adjusted odds-ratios (OR) for vaccination and 95% confidence intervals (CI) using logistic regression.

Results: We found 231 cases and 377 764 controls. Cases were more likely to have received exclusively acellular or mixed aP/wP vaccination for PC than controls [OR 2.35(95% CI: 1.42-3.88) and 1.97(1.30-3.01), respectively]. Receiving one, two or three doses of wP yielded ORs of 1.23 (0.74-2.05), 0.54 (0.30-0.98) and 0.42 (0.25-0.69), respectively.

Conclusions: A vaccination course with aP was associated with increased odds of developing pertussis when compared with wP, indicating lower immunogenicity of the acellular vaccine. Mixed PC with two doses of wP was more effective than a PC including exclusively aP or only one dose of wP. Further studies, including older age groups, are necessary in order to assess longer-term effects.

Status: Oral presentation at ESCAIDE<sup>9</sup>, manuscript under preparation.

## Scientific communication

- Two scientific papers published in Eurosurveillance, one as first author<sup>3</sup> and the other as a co-author<sup>6</sup>;
- Three oral communications, one at ESCAIDE 2012 (Edinburgh)<sup>2</sup>, one at TEPHINET Global Conference 2012 (Amman)<sup>5</sup> and one at ESCAIDE 2013 (Stockholm)<sup>9</sup>;
- Two posters presented, one at the Health Protection Agency Conference 2012 (Warwick)<sup>1</sup> and the other at ESCAIDE 2012 (Edinburgh)<sup>4</sup>;
- Two manuscripts under evaluation, submitted as a co-author<sup>7,8</sup>.

## Teaching experience

### Lab4Epi training module

Led organisation of Lab4Epi, a three-day training course for EPIET fellows, public health specialist registrars and FETPs based in the UK and Ireland in February 2013. The objectives of the module were to improve cooperation between epidemiologists and laboratory specialists and to build an understanding of the major role of public health laboratories in research, surveillance and outbreak investigations.

Fifteen participants were present: 11 EPIET/EPIET-associated programme fellows, one FETP fellow from Taiwan and three public health specialist registrars from the UK.

Status: completed.

### **Epidemiology and molecular epidemiology in public health 2012**

This HPA-credited training course, attended by virologists and microbiologists at HPA, provides an overview of molecular epidemiology, use of bioinformatics approaches and applications to current public health issues.

Gave lecture on epidemiological study design, focusing on the different types of studies and which design to use depending on the outcome of interest, the primary exposure and possible confounding variables. The lecture included an exercise with practical examples.

Status: Completed.

### **Computer tools in public health – Microsoft Access and Stata**

Organised training sessions for public health trainees and epidemiology fellows on the use of Microsoft Access and Stata in the context of outbreak investigation and surveillance.

Status: Completed.

## **International mission**

### **International assignment at WHO headquarters to support the international response to the outbreak of novel coronavirus and influenza A(H7N9)**

Assigned to the Pandemic and Epidemic Diseases – Global Influenza Programme for a period of four weeks which began on 29 April 2013. Supervised by Dr. Katelijjn Vandemaële and Dr. Anthony Mounts. Involved in the main activities of the team, including data collection, management and analysis, literature review and production of epidemiological reports and web updates for WHO on the novel coronavirus and influenza A(H7N9) outbreaks. Active participation in regular teleconferences with the WHO Regional and Country Offices, as well as with other international partners such as ECDC, Public Health England, INVS France and China CDC. Attended the World Health Assembly as an observer.

Status: Completed.

## **Other**

Conferences and modules attended

- Mini-project review module at HPA Colindale: Discussion of UK EPIET and associated programme fellows current projects, HPA Colindale, 1–2 March 2012
- Conference on statistical methods for infectious diseases, Open University Milton Keynes, 23–24 May 2012
- HPA Annual Conference 2012, University of Warwick, 11–12 September 2012
- Training programmes in Epidemiology and Public Health Interventions Network (TEPHINET) 7<sup>th</sup> Global Conference, Amman, 10–15 November 2012.

Internal presentations

- The EPIET fellowship
- Journal club on norovirus
- Report on the international assignment at WHO headquarters.

Junior duty doctor on-call rota at HPA Colindale

- On-call duties twice a month, providing support to healthcare professionals' enquiries regarding infectious disease incidents, immunisation and health protection. Responsible for organising the junior on-call rota at HPA Colindale after September 2012.

## **Supervisor's conclusions**

During his two-year fellowship at HPA/PHE Colindale, Carlos has undertaken a very wide range of applied epidemiology activities. Carlos has been a very dedicated fellow – meticulous, constructive in his attitude to learning and committed to public health. He has gained a high level of hands-on experience with projects of local, national and international experience. His work has been published in peer-reviewed publications and presented orally at national and international conferences. It has been a pleasure to work with Carlos.

## Next steps

After EPIET, Carlos Carvalho returned to Portugal to work as a public health consultant and epidemiologist in the northern health region. He is also teacher at the University of Oporto in part-time.

## References

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4. Carvalho C. Sporadic hepatitis A cases associated with sun-dried tomatoes, England, July-December 2011. Poster presented at the European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE) 2012, Edinburgh, United Kingdom, 24 October 2012.
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6. Pebody RG, Chand MA, Thomas HL, Green HK, Boddington NL, Carvalho C, et al. The United Kingdom public health response to an imported laboratory confirmed case of a novel coronavirus in September 2012. *Euro Surveill.* 2012;17(40):pii=20292.
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9. Carvalho C, Amirthalingam G, Andrews N, Ramsay M. Pertussis in England: different vaccine, different risk? Oral communication at the European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE) 2013, Stockholm, Sweden, 7 November 2013.