



## EPIET REPORT

### Summary of work activities

Peter Thomas Ndaula Kinross  
European Programme for Intervention  
Epidemiology Training (EPIET), 2011 cohort

## Background

### Pre-fellowship short biography

Prior to EPIET, Pete Kinross worked for three years as an epidemiologist in England at the Health Protection Agency (HPA) within the South East Regional Epidemiology Unit. He has a BSc in Biomedical Sciences from King's College London and an MSc in Reproductive and Sexual Health Research from the London School of Hygiene and Tropical Medicine.

### EPIET assignment

Pete was an EU-track EPIET fellow, commencing at the European Centre for Disease Prevention and Control (ECDC) in September 2011. He was placed in the Surveillance and Response Section's Rapid Assessment and Outbreak Group, joining ECDC's response and epidemic intelligence rotas. Supervision was under Annick Lenglet (EPIET, Cohort 10) until June 2012, then under the joint supervision of Lara Payne Hallström (EPIET, Cohort 9) and Gianfranco Spiteri (EPIET, Cohort 10).

## Fellowship projects

### Surveillance projects

#### **ECDC enhanced event-based surveillance during the 2012 Olympics and Paralympics – development of assessment methodology [1, 6, 15, 16]**

Pete was involved in developing a qualitative risk assessment methodology to define infectious disease and health event priorities for ECDC enhanced event-based surveillance during the 2012 Olympics and Paralympics [1]. He also participated in ECDC's implemented daily enhanced epidemic intelligence (EI) activities during the Games, producing ECDC daily bulletins and the weekly Communicable Disease Threat Report (CDTR) [15]. In addition he participated in daily telephone conferences with the HPA co-ordinated international infectious disease surveillance team [6]. He is co-author of a manuscript on the prioritisation method, which he presented at the plenary session at ESCAIDE conference 2012 [1, 16].

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Status: Completed. Article published in Eurosurveillance.

Abstract [1]: In 2012, London hosted the Olympic and Paralympic Games (London 2012), with events occurring throughout the UK between 27 July and 9 September 2012, and public health surveillance performed by the Health Protection Agency (HPA). A collaboration between the HPA and the European Centre for Disease Prevention and Control (ECDC) was established for detection and assessment of significant disease events (SDE) occurring outside the UK. Additionally, ECDC undertook an internal prioritisation exercise to facilitate ECDC's decisions on preferential enhanced monitoring of SDEs through epidemic intelligence activities for detection and daily reporting. A team of ECDC experts evaluated potential risks to London 2012, selecting and prioritising SDEs for event-based surveillance based on potential importation to the Games, occurrence during the Games, or export to the EU from the Games. The team opted for a multi-level disease prioritisation approach, including comprehensive disease selection, elaboration and use of a scoring system, a qualitative matrix, and a Delphi method. A list of 71 infectious diseases including deliberate release agents resulted from the selection of diseases for prioritisation. After application of the risk matrix and Delphi method, 27 diseases were considered as priorities for epidemic intelligence activities by ECDC for the EU for London 2012.

#### **Evaluation of a multi-country surveillance system for all-cause mortality (EuroMOMO) [2, 18]**

Pete evaluated the surveillance attributes and EU added value of EuroMOMO, a multi-country, all-cause mortality surveillance system hosted at the Statens Serum Institut in Copenhagen. The results of the evaluation contributed to ECDC's decisions regarding continuation of EuroMOMO's funding. Pete submitted the evaluation report to ECDC's Senior Management Team and subsequently to EuroMOMO's steering committee. It was presented at the 2012 Nordic Review and Project Review Modules [18]. An article on the report's results is being drafted by ECDC's Head of Epidemiological Methods [2].

Status: Completed.

#### **Descriptive analysis of national measles surveillance systems in EU/EEA Member States**

ECDC's Vaccine-Preventable Diseases (VPD) group requested a survey to collect information from EU/EEA Member States on changes to national measles surveillance systems and case definitions since 1998, to aid interpretation of measles surveillance data gathered via TESSy. Pete designed a questionnaire to collect this data. The project protocol was presented by the VPD team to EU/EEA Member States at the 'European VPD Network' meeting in November 2012. A pilot study with four Member States in March 2013 tested the questionnaire. Pete sent a finalised questionnaire and pilot study report to the VPD team.

Status: Completed.

Abstract: A questionnaire has been prepared for ECDC's VPD team to collect information from EU/EEA Member States on changes in national measles surveillance between 1998 and 2013, to inform analysis of trends in measles reports in the EU/EEA. Its 89 questions are grouped within four sections: Characteristics of the surveillance system from 1998–2013; case definitions from 1998–2013; laboratory methods used for measles surveillance from 1998–2013; measles surveillance in 2013. Its design (in Excel 2003) makes it easy and quick for respondents to fill the questionnaire, through provision of default answers for all questions; respondents can only change the date and free text fields. The questionnaire was piloted by four EU Member States, and an updated version was prepared based on the feedback.

## **Outbreaks**

#### **Multi-country outbreak of *Salmonella* Stanley, June–November 2012 [4, 7, 20, 21]**

Pete collected case-based information from EU-Member States, developed a European hypothesis-generating questionnaire, coordinating communications between the site EPIET/EUPHEM fellows in the affected Member States during questionnaire design. He provided regular updates to ECDC, the European Food Safety Agency (EFSA), the EC and EU Member State partners through written reports, oral presentations, updates to the ECDC website, and through co-authorship of joint Rapid Risk Assessments (RRAs) from ECDC and EFSA [7]. He contributed to the ECDC Annual Epidemiological Report and the ECDC–EFSA joint project report. He presented the multinational investigation to ECDC experts and representatives from Public Health Canada [20, 21]. He is first author of a manuscript together with Lieke van Alphen, EUPHEM fellow, Cohort 2011, and partners from 14 institutions, published in Eurosurveillance and referenced in that week's editorial [4,5].

Status: Completed.

Abstract [4]: Between August 2011 and January 2013, an outbreak of *Salmonella enterica* serovar Stanley (*S. Stanley*) infections affected 10 European Union (EU) countries, with a total of 710 cases recorded. Following an urgent inquiry in the Epidemic Intelligence Information System for food- and waterborne diseases (EPIS-FWD) on 29 June 2012, an international investigation was initiated including EU and national agencies for public health, veterinary health and food safety. Two of three local outbreak investigations undertaken by affected countries in 2012 identified turkey meat as a vehicle of infection. Furthermore, routine EU monitoring of animal sources showed that over 95% (n=298) of the 311 *S. Stanley* isolates reported from animal sampling in 2011 originated from the turkey food production chain.

In 2004–10, none had this origin. Pulsed-field gel electrophoresis (PFGE) profile analysis of outbreak isolates and historical *S. Stanley* human isolates revealed that the outbreak isolates had a novel PFGE profile that emerged in Europe in 2011. An indistinguishable PFGE profile was identified in 346 of 464 human, food, feed, environmental and animal isolates from 16 EU countries: 102 of 112 non-human isolates tested were from the turkey production chain. On the basis of epidemiological and microbiological evidence, turkey meat was considered the primary source of human infection, following contamination early in the animal production chain.

### **Novel coronavirus associated with travel to Saudi Arabia and Qatar (MERS-CoV), September–October 2012 [5, 8]**

As ECDC's EI 24/7 duty officer, Pete reported the initial case report on ProMed to ECDC's daily threat assessment meeting, summarised subsequent case reports, and contributed to ECDC's first RRA for the EC, and its updates [5]. He was a co-author for a published *Eurosurveillance* article [8].

Status: Completed.

Abstract [5]:

Two cases of rapidly progressive acute respiratory infection in adults associated with a novel coronavirus have generated an international public health response. The two infections were acquired three months apart, probably in Saudi Arabia and Qatar. An interim case definition has been elaborated and was published on the World Health Organization website on 25 September 2012.

### **Rise in *Cryptosporidium* cases in selected EU Member States, 2012 [9]**

A rise in number of cases of *Cryptosporidium* was observed in the UK, the Netherlands, Germany and Ireland in the summer of 2012. Pete was first author for ECDC's RRA, written in collaboration with these EU Member States and the WHO Regional Office for Europe [9]. A hypothesis was generated that the rise in cases might be due to increased rainfall. This was the basis for Pete's research project (see below).

Status: Completed.

Abstract [9]: An increase in cryptosporidiosis notifications has been observed in the United Kingdom, the Netherlands and Germany since August 2012 that is likely to be real, and not due to surveillance or notification artefacts. The available information from investigations in the United Kingdom, the Netherlands and Germany indicates that there is not a single, common source, but rather suggests a combination of several causes. These may include climatic drivers, such as the increased rainfall in summer 2012 in these countries or a widely distributed commonly consumed product. There is however no evidence for it at this stage and further investigations are ongoing. The overall threat for the European Union/European Economic Area (EU/EEA) is considered to be low. EU/EEA Member States should be alert to an increase in cases as observed in the United Kingdom, the Netherlands and Germany, particularly in relation to immunocompromised and other at-risk groups as they may present with a more severe manifestation of cryptosporidiosis.

### **Outbreak of *Cryptosporidium* infections in veterinary students in 2013 in Uppsala, Sweden [3, 10, 17]**

Under placement at the Swedish Institute for Communicable Diseases (SMI) in March 2013, Pete was an investigator in an SMI co-ordinated outbreak investigation, together with the Swedish National Veterinary Institute (SVA) and the Swedish University of Agricultural Sciences (SLU). He undertook a field site visit and subsequent analytical cohort study producing a technical report with SMI and an article for peer review [3, 10]. Its abstract was accepted for oral presentation at ESCAIDE conference 2013 [17].

Status: Completed.

Abstract [10]: Introduction: In March 2013, a veterinary student with gastrointestinal symptoms tested positive for *Cryptosporidium*; four classmates reported similar symptoms. We initiated an outbreak investigation to identify possible infection sources and risk factors for symptomatic *Cryptosporidium* infection.

Methods: We performed active case finding among the affected university students and staff and reviewed Sweden's *Cryptosporidium* notifications. 'Probable' cases were university persons reporting diarrhoea between 21 January and 14 April 2013. *Cryptosporidium* microscopy was used to 'confirm' cases and test calf faecal specimens. Positive specimens were PCR subtyped. Following hypothesis-generating telephone interviews and site visits, an online questionnaire was sent to the cohort of 82 fourth-year students for analysis of risk factors for infection.

Results: Sixty-four students returned questionnaires (79%), identifying seven probable and seven confirmed cases; five were GP60 subtype IIaA16G1R1b, two were IIaA24G1. All 14 cases attended the university field clinic before symptom onset (14/37 attendees, 33%). Eleven cases visited at least one of four farms where students recalled seeing calves with diarrhoea. *C. parvum* subtype IIaA16G1R1b was identified in calves at one of these. Entering pens of calves with diarrhoea (6 cases, RR:7.6; 95%CI:1.7–33.5), eating in clinic cars (12 cases, RR:9.1; 1.3–65.8), and drinking farm tap water (3 cases, RR:4.4; 2.0–9.7) were associated with being a case. Washing hands at least twice per farm visit (0 cases;  $p=0.03$ ) and using additional hand sanitisers (6 cases, RR:0.41; 0.16–1.08) were protective.

Discussion: Results point to direct and indirect infection from infected calves on farms as this outbreak's likely cause. To reduce infection risks, we recommend frequent hand-washing using proper technique, particularly before eating, and dissuasion from drinking farm tap water and eating in clinic cars to minimise possible exposure to fomites.

## Research

### Rise in cryptosporidiosis cases possibly linked to increased rainfall during 2012 [16]

Pete led a research project testing a hypothesis from an ECDC Rapid Risk Assessment (see above [8]) that increased cryptosporidiosis reports in summer 2012 were associated with increased precipitation. Pete presented the project's main protocol and a proposal for a pilot study at the Nordic Review Module in May 2013 at THL, Finland, and produced a final report [19].

Status: Completed.

Final report's executive summary: A rapid risk assessment undertaken by ECDC into increased *Cryptosporidium* reports in summer 2012 in Germany (DE), the Netherlands (NL) and United Kingdom (UK) concluded that there may have been an association with the summer's unusually high rainfall. This study investigates the association between cryptosporidiosis and precipitation in 2003–2012 in selected EU Member States: DE, UK, Belgium (BE) and Ireland (IE).

National public health institutes in BE, IE and UK shared case-level data specifically for this study using a standard template. These data were 'cases', 'week' and 'NUTS area'. Data are publicly available in DE (SurvStat). Member States data were aggregated to NUTS1 or NUTS2 levels (n=31). Daily precipitation estimates were acquired by ECDC's E3 team from NASA's NOAA satellite and aggregated to the same 31 NUTS areas.

There were sufficient *Cryptosporidium* reports for time series analysis ( $\geq 1.5$  cases/week) in 20/31 NUTS areas. The annual peaks in Ireland's three NUTS areas were in weeks 19–20, and in weeks 35–41 in 17 NUTS areas.

Excess precipitation scores were generated for all 31 NUTS areas. These scores indicate the number of days in period 'W' with more rain than a threshold value 'T'. Time series models were built using these scores, assuming negative binomial or Poisson distributions, and 26- or 52-week seasonality. Assessment of AIC, BIC and log likelihood scores revealed that they did not fit well.

Spearman's rank coefficients indicated little correlation between precipitation scores and *Cryptosporidium* reports within any of the 31 NUTS areas, whether scores were lagged by 0, 1, 2, 4, 8 or 14 weeks. Scores were incorporated as a covariate into the univariate time series models of *Cryptosporidium* reports, and these same lags were tested. The resulting multivariable models were all less useful than the univariate model, as indicated by adjusted R-squared, AIC and BIC scores, and likelihood ratio tests.

This ecological study was designed to identify broad associations using blunt measures of exposure (excess precipitation scores) and outcome (total *Cryptosporidium*) within broad geographical areas (NUTS1). Its analyses and results suggest recommendations for more specific studies (Table 1). These are arranged in Sections A to F in order of their recommendations' potential impact, as are the recommendations within each section. Furthermore, the study protocol developed and STATA scripts will be useful for similar ecological studies.

## Teaching experience

- **Case study of nosocomial iGAS in southern Sweden.** Communication exercise with EUPHEM fellows during their management course. Pete developed the teaching materials and engaged in role-play during the course.  
Status: Completed.
- **Lectures on outbreak investigation.** Pete developed and presented two one-hour lectures entitled 'Outbreak Investigation' to Masters in Public Health students from Södertörns Högskola, Sweden, within their course 'Infectious disease epidemiology'.  
Status: Completed.
- **Facilitated case study on outbreak investigation.** Pete led two groups of SLU's fifth year veterinary students through a case study on outbreak investigation (trichinosis infection associated with culinary consumption of horse meat) within SLU's course 'Veterinary public health with applied epidemiology and epizootology'. Incidentally, this one-day course coincided in time and place with the first onset date of SLU's *Cryptosporidium* outbreak described above.  
Status: Completed.
- **Training in EpiData entry.** Pete adapted EpiData Entry training material in collaboration with ECDC's Training Section and presented it to ECDC's Rapid Alerts and Outbreak Group in two afternoon sessions.  
Status: Completed.
- **Developed case scenario exercise for EpiData usage in response to multi-country outbreaks.** Pete wrote and developed all material for a half-day case scenario exercise, using a real scenario of ECDC response during the global response to the novel coronavirus. The exercise included a 'simulation inject' of

a second outbreak: HUS/EHEC infections associated with unknown consumption of horsemeat. Taught skills included creating an EpiData data entry template from a one-page Microsoft Word document, merging emailed EU Member States data, duplicate data entry, verifying duplicate entry, exporting to Microsoft Excel. The preparatory 'homework' email was sent in March 2013. The exercise was postponed due to the initial alert of the *Cryptosporidium* outbreak.  
Status: Prepared.

## Other

- **Nominated as cohort representative.** Activities included: coordinating and chairing cohort representative's quarterly teleconference with ECDC; attending annual EPIET Training Site Forum (ETSF) and EUPHEM Training Site Forum; coordinating collection of peer-to-peer country guides in 2012 and 2013 for new EPIET/EUPHEM fellows; and conducting four surveys of current fellows in EPIET, EUPHEM and EPIET-associated Programmes (EAPs).
- **Epidemic Intelligence duty** [11-15]. Pete performed the tasks of a '24/7' duty officer at ECDC in March, June and September 2012 and as a 'mass gatherings officer' in June–September 2012. In so doing, he compiled the official daily and weekly reports on ECDC's Epidemic Intelligence activities for international stakeholders [11–13] under the UEFA EURO2012 and the 2012 Olympics and Paralympics [14, 15]. This required regular screening of official information sources (e.g. the Early Warning and Response System (EWRS), ECDC's Epidemic Intelligence Information Systems (EPIISs) and official national bulletins); unofficial sources (e.g. ProMed, FluTracker); competent independent use of machine translation and news aggregate software (e.g. MedISys, PULS, GPHIN, HealthMap); and presentation of detected signals to ECDC experts at the daily Round Table meeting [13].
- Pete was on **duty, out-of-hours**, over Sweden's 21–25 June 2012 Midsummer public holiday, coinciding with day one of ECDC's West Nile Virus monitoring season. During those 96 hours he responded to one IHR message, four EWRS messages, and three EPIS Urgent Enquiries. Additionally, two RRA updates were undertaken for the European Commission (cutaneous anthrax in IDUs and viral meningitis in Romania). He also held daily teleconferences with ECDC's EI liaison officer in Poland, producing three daily 'UEFA EURO 2012 cup' ECDC bulletins for ECDC stakeholders [11, 12, 14].

## Scientific communication

### Peer-reviewed publications

1. Economopoulou A, Kinross P, Domanovic D, Coulombier C. Infectious diseases prioritization for event-based surveillance at the European Union level, for the 2012 Olympic and Paralympic Games. *Euro Surveill.* 2014;19(15):pii=20770. Available from: <http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=20770>
2. Kinross P, Lenglet A, Ciancio B. Evaluation of a multi-country surveillance system for all-cause mortality monitoring in the EU. Article being drafted by BC.
3. Kinross P, Beser J, Troell K, Silverlås C, Björkman C, Lindh C, et al. Field clinic exposure to calves with diarrhoea associated with *Cryptosporidium parvum* infection in a cohort of veterinary students in Sweden in 2013. [Article submitted.]
4. Kinross P, van Alphen L, Martinez Urtaza J, Struelens M, Takkinen J, Coulombier D, Makela P, et al. Multidisciplinary investigation of a multicountry outbreak of *Salmonella* Stanley infections associated with turkey meat in the European Union, August 2011 to January 2013. *Euro Surveill.* 2014;19(19):pii=20801. Available from: <http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=20801>
5. Hugas M, Beloeil PA. Controlling *Salmonella* along the food chain in the European Union – progress over the last ten years. *Euro Surveill.* 2014;19(19):pii=20804. Available online: <http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=20804>
6. Danielsson N, on behalf of the ECDC Internal Response Team, Catchpole M. Novel coronavirus associated with severe respiratory disease: Case definition and public health measures. *Euro Surveill.* 2012;17(39):pii=20282. Available from: <http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=20282>
7. Jones J, Lawrence J, Payne Hallström L, Mantero J, Kirkbride H, Walsh A, et al. On behalf of the International Team. International infectious disease surveillance during the London Olympic and Paralympic Games 2012; process and outcomes. *Euro Surveill.* 2013;18(32):pii=20554. Available from: <http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=20554>.

**Non-peer reviewed publications and reports**

8. Joint ECDC/EFSA Rapid Risk Assessment: Multi-country outbreak of *Salmonella* Stanley infections. 20 September 2012.  
Available from: [http://ecdc.europa.eu/en/publications/Publications/20120921\\_RRA\\_Stanley\\_Salmonella.pdf](http://ecdc.europa.eu/en/publications/Publications/20120921_RRA_Stanley_Salmonella.pdf)
9. ECDC Rapid Risk Assessment: Severe respiratory disease associated with a novel coronavirus. 24 September 2012.  
Available from: <http://www.ecdc.europa.eu/en/publications/Publications/RRA-Novel-coronavirus-final20120924.pdf>
10. ECDC Risk Assessment: Increased *Cryptosporidium* infections in the Netherlands, United Kingdom and Germany in 2012. 19 November 2012.  
Available from: <http://www.ecdc.europa.eu/en/publications/Publications/cryptosporidium-infections-netherlands-united-kingdom-germany-risk-assessment.pdf>
11. Kinross P, Beser J, Troell K, Lindh C, Löfdahl M. SMI Outbreak Report: Outbreak of *Cryptosporidium parvum* infections associated with clinical veterinary students in Uppsala, Sweden in 2013
12. ECDC communicable disease threat reports (CDTRs), e.g. Kinross P, et al. CDTR Week 25, 17-23 June 2012.  
Available from: <http://www.ecdc.europa.eu/en/publications/Publications/ECDC%20CDTR%2022.06.2012.pdf>
13. ECDC communicable disease threat reports (CDTRs), e.g. Kinross P, et al. CDTR Week 26, 24-30 June 2012.  
Available from: [http://www.ecdc.europa.eu/en/publications/Publications/CDTR\\_web\\_2012\\_6\\_28.pdf](http://www.ecdc.europa.eu/en/publications/Publications/CDTR_web_2012_6_28.pdf)
14. ECDC Round Table Reports, e.g. Kinross P, et al. 21 September 2012: includes 'Novel Coronavirus - Saudi Arabia – case report. Source: ProMed'.
15. ECDC CDTR Daily bulletins for the EURO 2012, e.g. Kinross P, et al. 24 June 2012.
16. ECDC CDTR Daily bulletins for London 2012, e.g. Kinross P, et al. 20 August 2012.

**Oral presentations**

17. ESCAIDE 2012: Prioritizing health events for ECDC epidemic intelligence activities at the European Union level for the London 2012 Olympics mass gathering. 26 October 2012.
18. ESCAIDE 2013: Field clinic exposure to calves with diarrhoea associated with *Cryptosporidium parvum* infection in a cohort of veterinary students in Sweden in 2013. 5 November 2013.
19. Nordic Review Module 2012, SMI, Sweden. Evaluation of excess mortality monitoring by EuroMOMO during its nascent years. 3 May 2012.
20. Nordic Review Module 2013, THL, Finland. Ecological study investigating the association between cryptosporidiosis and excess rainfall in Europe. 2 May 2013.
21. ECDC 'Threat in Depth' series: The multi-agency response to the large multi-country outbreak of *Salmonella* Stanley in 2011-2013: epidemiological, veterinary, food safety and microbiological perspectives. 30 May 2013.
22. ECDC: Presentation for Public Health Agency of Canada. A multi-sectorial, multi-agency response: Multistate outbreak of *Salmonella* Stanley infection. 8 February 2013.
23. ECDC: Presentation to University of Tallinn, Estonia, Public Health MSc and PhD students and professors. Epidemiological activities at ECDC: an EPIET Fellow's perspective. 16 February 2013.

**Moderation**

24. ESCAIDE 2012: Moderated the parallel poster session 'Novel methodological approaches for disease investigation, surveillance and control'. 25 October 2012.

## Supervisors' conclusion

During his two years as an EPIET fellow, Pete Kinross energetically tackled a wide variety of projects and activities, gaining exposure to a diverse range of infectious disease topics and epidemiological methods in public health, and in areas different to his previous experience and academic training. Working with ECDC's disease-specific programmes and in support of the core activities of surveillance, preparedness and response at EU level, he has gained an understanding of the collaborative and multidisciplinary stakeholder approach needed to achieve public health objectives. In reaching the EPIET fellowship's objectives he had to learn good project and time management and develop his ability to multitask and a skill set that helped him to quickly adapt to new challenges. Pete has worked effectively in a challenging multinational and multidisciplinary environment and developed personally and professionally throughout his fellowship.

– Lara Payne Hallström and Gianfranco Spiteri

## Next steps

In May 2013, Pete received confirmation of successful application to the position of 'Expert in Surveillance of Healthcare-Associated Infections' at ECDC, which started in October 2013.