



Suzan Trienekens

## ***Background***

### **Pre-fellowship short bio**

After MSc Health Sciences worked as an epidemiologist at the Institute of Tropical Medicine in Antwerp, the Institute for Public Health and the Environment in the Netherlands, CIDSC and FES SEaL on topics including malaria, HIV/STI, bloodborne viruses, gastrointestinal disease and TB.

### **FETP assignment**

Conducted the FETP fellowship at FES Liverpool, supervised by Dr Paul Cleary. Completed two outbreaks (national case-control study and cohort study), evaluation and implementation of a surveillance system, research projects, training and two international missions (for WHO and MSF). Two oral presentations at international conferences and two manuscripts to be published within the next few months, with three still in progress.

## ***Fellowship projects***

### **Outbreak(s)**

- 1. Investigation of an outbreak of gastrointestinal illness following 2014 New Year's Events at Crewe Hall Hotel, Crewe**

#### **Abstract**

**INTRODUCTION:** A total of 450 guests from several local authority areas across the United Kingdom attended a New Year's event at the Crewe Hall Hotel, consisting of a New Year's Eve dinner on Wednesday 31st December 2014 and New Year's breakfast on Thursday 1st January 2015. The Hotel is under the jurisdiction of Cheshire East Council. Cases of gastroenteritis in people who had attended the New Year's Eve events at Crewe Hall Hotel were reported. An Outbreak Control Team [OCT] was convened to manage the outbreak. The outbreak was managed in-line with the Cheshire & Merseyside Multi-Agency Outbreak Plan (PHE, 2014a) which is based on the PHE Communicable Disease Outbreak Management – Operational Guidance (PHE, 2014b).

**METHODS:** Environmental, microbiological and epidemiological investigations were undertaken. Environmental Health Officers [EHOs] from Cheshire East Council inspected and took environmental samples from the Hotel premises. These samples, along with stool samples from four cases, were analysed microbiologically. A retrospective cohort study was conducted using an online questionnaire to obtain information from guests. Univariable and

multivariable logistic regression analyses were undertaken to estimate the Relative Risk [RR] which is a measure of the strength of association between an exposure and the disease.

**RESULTS:** There were 162 valid responses to the survey, with an age range of six to 77 years and a median age of 53 years; 95 respondents were symptomatic, equating to an attack rate of 59% among respondents and at least 21% of all those attending the New Year event (95/450). The majority of the respondents attended the breakfast on 1st January (120/162), and the attack rate for the breakfast guests who responded to the survey was 66%. The epidemic curve was consistent with a point source exposure of infection. Thirteen guests reported symptoms of diarrhoea and vomiting starting before breakfast; eight of these and one symptomatic staff member were present at breakfast on 1st January 2015. The predominant symptoms were lethargy, nausea, diarrhoea, abdominal pain and vomiting. Median duration of illness was two days. Eight cases were seen by a GP. None of the cases were hospitalised. Environmental investigation identified issues with maintenance of staff toilets, hand contacted surfaces and adherence to the sickness policy operated by the premises. Epidemiological investigation showed that attendance at breakfast was associated with illness, (Risk Ratio, RR: 1.73 [CI: 1.15, 2.59]), but no association was found between illness and attendance at the New Year's Eve events in any of the three rooms (RRs: Continental Room 1.12 [CI: 0.87, 1.46]; Ranulph & Oak Parlour 0.92 [CI: 0.61, 1.38]; State Room 0.93 [CI: 0.72, 1.21]). None of the food items served at the three dinners, in any of the rooms or at breakfast appeared to be associated with an increased risk of becoming ill. Final Outbreak Report: GI Outbreak, Crewe Hall Hotel, 2015 Of the four stool samples tested, one tested positive for Norovirus. Another sample tested positive for campylobacter on PCR [Polymerase Chain Reaction] but was negative on culture. There were no other positive microbiological findings from any other stool samples. 25 environmental swabs were also negative for Norovirus and other gastrointestinal [GI] pathogens.

**DISCUSSION & CONCLUSION:** This was a large outbreak of gastrointestinal illness and the clinical presentation of those affected appeared to suggest that the possible pathogen could have been viral. The epidemic curve also fits with the infective period of Norovirus (24 to 48 hours, but less often, 12 hours). Microbiological investigation detected Norovirus in one stool sample, a second sample tested equivocal for campylobacter. There were no other positive stool or environmental samples which can substantiate any pathogen as the cause of this outbreak or link the outbreak to any specific source. Attendance at breakfast was associated with becoming ill. However none of the food items served at any of the three dinners or at breakfast appeared to be associated with an increased risk of becoming ill. The analysis found no conclusive evidence of foodborne transmission. The OCT was initially aware of the occurrence of symptoms of gastroenteritis in a staff member on 1st January 2015, whilst at work. Subsequently the epidemiological investigation revealed that 13 guests reported onset of symptoms (diarrhoea and vomiting) that started before the time of the breakfast and eight of these guests also attended the breakfast on 1st January. This means that it is possible that other Hotel guests may have been exposed to the presumptive viral infection via person-to-person contact before breakfast, during breakfast or via contamination of objects in the breakfast room including the serving utensils rather than from food. The effect of exposures on illness could have been underestimated given the low response rate (36%), the majority of whom reported symptoms (66%). The investigation was also limited by the delay in notification to PHE and Environmental Health Department and paucity of stool samples submitted. By the time the outbreak was notified, all guests had left the Hotel and dispersed, and the majority had recovered from their symptoms.

## **Tasks undertaken personally**

Drafted the protocol, designed the cohort study, designed the questionnaire, distributed the questionnaire, cleaned data, analysed data, written up results in an outbreak report.

## **Outputs**

Outbreak report for OCT

## **2. PHE/GOARN epidemiologist mission as part of the WHO Ebola response in Sierra Leone**

Description:

Involved in activities the WHO Tonkolili office undertook:

- Meeting with the Case Investigators daily to discuss issues, monitor their alert investigations and other activities.
- Maintaining and analysing a database, recording a summary of the alert investigations to keep track of the alerts and corresponding lab results, look at trends in alert over time (e.g. % alive alerts, % false alerts, % contact tracer met in the field, general trend of number of alerts and number per Chiefdom).
- Organising and developing refresher training for Case Investigators focused on filling in the Case Investigation Forms to avoid discrepancies and discuss issues, 2 x one morning.
- Contributing to the Active Search for Alerts Programme, both in the community and the health care settings, trying to actively find alerts and encourage people to alert if a suspected case has been found.
- Collating and cleaning all the available information (CDC VHF, MSF, DHMT, DERC) on confirmed cases to provide a comprehensive and easy-to-use database for different partners to work with.
- Field visits to monitor Case Investigators, active case finding through ASAP and quarantined homes to ensure their wellbeing and monitor the contact tracing.
- Compiling a presentable DERC report, describing the EVD response in Tonkolili since the start of the outbreak, containing texts from the DCC, DC and DMO, all pillars and all DERC agencies (>60 pages).
- Review weekly epidemiological outputs
- Setting up and maintaining an archive for the work done at the office

## **3. Investigation of an national outbreak of Cryptosporidium parvum, 2015**

### **Abstract**

Not available yet

### **Tasks undertaken personally**

Drafted the protocol for the trawl and case-control study, designed the questionnaires, distributed the questionnaire, cleaned data, analysed data, written up results in an outbreak report.

### **Outputs**

Outbreak report for OCT, manuscript planned to be drafted.

## **Surveillance project(s)**

### **1. Evaluation of the enhanced surveillance system for suspected CPE in Greater Manchester**

#### **Abstract**

An enhanced surveillance system for suspected CPE was implemented in Greater Manchester in May 2014 to better inform infection control measures. The system was set up as an interim system, operational until June 2015, when the national surveillance system was implemented. Eight trusts in Greater Manchester collected basic data as well as risk factor data for suspected CPE cases on a voluntary basis and submitted these data to the Health Protection Team where data was collated and analysed. Monthly bulletins containing data from all trusts were distributed on a monthly basis. Questionnaires and face-to-face interviews with trusts, stakeholders and HPT staff highlighted that data collection tools were easy to use and it was easy to submit data to the HPT. CPE was seen as an important public health problem. However, collection of enhanced risk factor data was time-consuming and not always feasible, especially for trusts with higher numbers of cases. Data completeness for these risk factors was low. Allocating extra resources to collect and submit data was challenging. Data cleaning was time-consuming for the data analyst at HPT level. The bulletins were perceived as useful, however presented data did not always match data held at trust level which sometimes led to discussions between HPT and trust.

Recommendations for future similar surveillance systems include piloting the surveillance system if time allows, integrating the system in an existing surveillance system, discussing human resources available for the collection and submission of data and creating a forum to discuss issues as they arise.

#### **Tasks undertaken personally**

Drafted protocol, designed questionnaires, cleaned and analysed data, written up results.

#### **Outputs**

Report for distribution among the stakeholders.

### **2. Novel use of community-based surveillance with integrated cross-sectional surveys to identify health priorities in Mtendeli Refugee camp, Tanzania, February-March 2016.**

#### **Abstract**

##### **Introduction**

In February 2016, approximately 5000 Burundian refugees were accommodated in newly-built Mtendeli camp, Tanzania. No public health data were available. To provide more timely and comprehensive health data with limited additional resources, Médecins Sans Frontières implemented community-based surveillance (CBS) with additional integrated cross-sectional surveys carried out by the same outreach team. With this new surveillance design we aimed to identify health priorities and inform public health action.

## Methods

We trained 17 outreach workers who conducted weekly visits to all households in Mtendeli and collected structured CBS data on demographic breakdown of households; births, deaths, self-reported diarrhoea and fever in the preceding week. In different weeks, they additionally included surveys for mosquito net coverage, measles and cholera vaccination coverage, and malnutrition. We calculated morbidity prevalence, mortality rates, vaccination/mosquito net coverage and severe acute malnutrition (SAM). Data from epidemiological weeks 9-12 are presented.

## Results

We collected information for an average 5,051 refugees (1,072 households) weekly; 21% were <5 years and 51% female. Fever and diarrhoea prevalence was 9.2% and 2.1% in <5 years respectively and 4.6% and 0.4% in >5 years. Two (neonatal) deaths were reported during this period. Households owned a mean of 0.3 intact mosquito nets. Vaccination coverage in children <15 years was 83% for measles, 30% for cholera. SAM was estimated at 0.5% in children <5 years.

## Discussion

Standard emergency thresholds for mortality, morbidity and malnutrition were not reached during the reporting period. Our novel approach integrating targeted surveys into CBS allowed us to efficiently identify public health priorities such as measles vaccination and mosquito net distribution utilising the available infrastructure. We recommend consideration and evaluation of further use of CBS with integrated surveys in similar settings.

## Tasks undertaken personally

Drafted the protocol, designed and implemented surveillance system. Cleaned, analysed and reported data. Recruited, trained and supervised outreach team.

## Outputs

4 weekly reports, shared with stakeholders. Handover document. Manuscript planned to be drafted. Oral presentation accepted for ESCAIDE 2016.

## Research

### 1. Comparing the impact of influenza A(H1N1)pdm09 in South Asian and other ethnic groups, England, 2009

#### Abstract

In comparison to other countries, little research has been done into the impact of the influenza A(H1N1) pandemic on non-White British ethnic groups in England. This study aims to explore ethnic, socioeconomic and demographic factors in relation to the UK 2009 influenza pandemic. The objectives of this study are to identify the occurrence of influenza A(H1N1) infection in South Asian populations compared to other ethnic populations at the onset of the 2009 influenza pandemic in England and to compare the characteristics of South Asian influenza cases with those of cases in other ethnic populations. Data for analyses is composed by data from FluZone, data imputed through the SANGRA method and population denominator data. Data from the FluZone surveillance system is collected from April to July 2009. This system

collected demographic, clinical and epidemiological information on all laboratory confirmed cases of influenza A(H1N1) resident in England. Since FluZone contains limited ethnicity data, the SANGRA computerised name recognition algorithm is used to impute ethnicity data, where data on ethnicity is missing. Population denominator data from 2009 by age group, sex and ethnicity are collected from the ONS website.

**Tasks undertaken personally:**

Analysed data. Written up results and drafted manuscript.

**Outputs**

Manuscript currently under review with co-authors.

**2. Carriage of multi-drug resistant Gram-negative bacteria among acute admissions to hospital following international travel (the TRANSIT\* study): multicentre stratified cross-sectional study [\*Threat of Resistance to Antibiotics for NHS from International Travel]**

The increasing global movement of people is one of the concerns for global spread of resistant bacteria. The importance of travel in this spread becomes apparent when people travel or migrate from countries with high levels of antimicrobial resistance to countries with lower levels of resistance. Identification and isolation of patients colonised with drug resistant organisms is crucial to ensure appropriate treatment and prevent the spread to other patients within the hospital and the community in England. Early screening for detection of carriers could be performed by microbiological screening or screening for risk factors of high-risk patients, but to date, efficient evidence-based infection control measures are lacking. There is an urgent need to conduct studies investigating the risk factors for acquiring antimicrobial resistant bacteria while travelling abroad to high risk areas. The study will provide evidence on which patients to isolate and screen on admission to limit the spread of antimicrobial resistance in England.

**Tasks undertaken personally:**

Coordinated protocol writing together with senior epidemiologist. Chaired teleconferences with several clinical, epi and microbiologist collaborators.

**Outputs**

Protocol as application for NIHR grant.

**3. Existing process and data collection for health assessments for asylum seekers in initial accommodation centres in England**

The project will involve designing a protocol and undertaking a scoping exercise to map out the existing health care provision (including screening and immunisation) and data collection systems for asylum seekers provided through initial accommodation centres. The project will include identifying examples of good practice, evaluating the current system and proposing recommendations for improving the health care provision and data collection in initial accommodation centres for asylum seekers. Information will be shared with relevant stakeholders and a repository of information created. The objectives of this project are:

1. To map the pathways for UK asylum seekers in order to identify points at which health assessments are offered.
2. To describe the current health assessment provision at IACs including:
  - a) Guidance documents and protocols in place (or development) that are used by healthcare practitioners within IACs
  - b) Stakeholders/human resources involved in providing the health assessment
  - c) Information provided to the asylum seeker (and dependant(s)) about accessing health services and how this is communicated
  - d) Elements of the health assessment offered and to whom
3. To describe the collection and management of data from the health assessments at IACs including:
  - a) Available health data pre-arrival to the IAC
  - b) Primary data collection process
  - c) Procedures for updating data including laboratory results
  - d) Storage of data (locally/regionally/centrally)
  - e) Sharing data
    - i. With onward healthcare professionals in dispersal areas
    - ii. Between IACs if an individual moves
    - iii. With the immigration detention estate
  - f) Aggregation, collation and analysis
  - g) If data are analysed: communication and use of data, and feedback
4. To collate and summarise the data collected on uptake of the health assessment, screening and immunisations.

The findings will be used to inform service improvements and to contribute to ensuring that the health needs of asylum seekers are met for both the benefit of the individual and wider public health. In addition, data collection can support surveillance and inform the future provision of healthcare.

**Tasks undertaken personally:**

Drafted the protocol, consent form and interview guide.

**Outputs**

Protocol, consent form and interview guide.

#### **4. Twenty years and counting: Epidemiology of an outbreak of isoniazid-resistant tuberculosis in England, 1995-2014**

An outbreak of isoniazid-resistant tuberculosis first identified in London has now been ongoing for twenty years, making it the largest drug-resistant outbreak of tuberculosis documented to date. We identified culture-confirmed cases with the same type molecular strain type and extracted demographic, clinical, microbiological and social risk factor data from surveillance systems. We summarised changes over time and used kernel density estimation and k-function analysis to assess geographic clustering. From 1995 to 2014, 508 cases were reported, with a declining trend in recent years. Overall, 70% were male (n=360), 60% UK born (n=306), 39% white (n=199), and 26% black Caribbean (n=134). Median age increased from 25 in the first five years to 42 in the last five. Approximately two thirds of cases reported social risk factors: 45% drug use (n=227), 37% prison link (n=189), 25% homelessness (n=125) and 13% alcohol dependence (n=64). Treatment was completed at 12 months by 52% of cases (n=206), was significantly lower for those with social risk factors ( $p<0.05$ ), but increased over time for all patients ( $p<0.05$ ). The outbreak remained focused in north London throughout. Control of this outbreak requires continued efforts to prevent and treat further active cases through targeted screening and enhanced case management.

##### **Tasks undertaken personally:**

Analysed data, written up results and drafted manuscript.

##### **Outputs**

Manuscript currently under review at Eurosurveillance. Oral presentation given at TEPHINET – first prize.

##### **Scientific communication**

- Two oral presentations, one at ESCAIDE and one at TEPHINET
- One oral presentation, at the regional training slot (Confound it! – FES Liverpool)
- 1 manuscript currently reviewing minor revisions, 1 manuscript drafted, 3 manuscripts in progress.

##### **Teaching experience**

###### **1. Linelisting in Excel**

A training needs assessment carried out in 2014 highlighted the need for linelisting and Excel training for the three Health Protection Teams in the North West. I prepared exercises for linelisting and Excel which will be useful to do basic analyses and presentation of results which were discussed during a one hour video conferencing session. It was held in August 2015 and very well received.

###### **2. Introduction to Stata**

A training needs assessment carried out in 2014 highlighted the need for Stata training to the C&L HPT and various SPRs (individual training). Together with Senior Scientist identified elements of Stata to cover and prepared materials. Training was given in August and September 2015. All training was very well received.

### **3. One-day HCAI training course**

A training needs assessment carried out in 2014 highlighted the need for training on HCAI across the North West (HPTs and Trusts). This day will be organised by FES Liverpool and is planned for November 2015 and cover different aspects of HCAI.

### **4. Global Health Session - Liverpool university**

Global Health Session at Liverpool University, consisting of a lecture and case study for MPH students

### **5. Rapid assessment module**

Share mission experience in 1 hour monthly teaching session across the North West (FES + HPTs)

## **International mission(s) [If applicable]**

### **1. PHE/GOARN epidemiologist mission as part of the WHO Ebola response in Sierra Leone**

As cases continue to be reported from Sierra Leone, WHO continued its efforts to control EVD transmission. The mission was based in Tonkolili, a rural central District in Sierra Leone, bordering seven other Districts. Tonkolili comprises 11 Chiefdoms and has a total of approximately 350,000-400,000 inhabitants. Tonkolili has had about 450 EVD cases since the first case was reported in July 2014. Objectives of the mission were to a) support high-quality data collection, management, analysis and reporting, b) ensure effective contact tracing takes place, c) provide surveillance training and supervision when necessary, d) ensure an effective alert monitoring and response system is in place, e) ensure systematic capture of lab data, f) support in the development and implementation of analytical studies, g) liaison with partners undertaking surveillance activities.

## 2. MSF epidemiologist mission: Implementation of a surveillance system in Mtendeli refugee camp, Tanzania

Design, initiate implementation and coordinate all community based surveillance activities in Mtendeli. This surveillance system included the ability to monitor population dynamics, estimate weekly crude and under-five mortality rates and the ability to detect outbreak-prone diseases (acute watery diarrhoea, measles and other epidemic-prone diseases). Tasks were to: hire, train and organise outreach workers for all community based surveillance activities; ensure data entry, analysis and interpretation of outbreak and community-based surveillance is optimal and producing important emergency indicators (crude mortality rate, under five mortality rates etc.); Day-to-day supervision, training and coaching of data management and surveillance staff; Perform nutrition, mortality and vaccine-coverage; Collaborate in conducting risk assessments for vaccine-preventable diseases, general emergency preparedness plans and burden of disease of the affected population

### **Next steps**

I will be applying for field epidemiology posts in an international setting.

### **References - List of the publications and communications**

#### **Manuscripts**

Suzan Trienekens\*, Catherine Smith\*, Charlotte Anderson, Andrew Hayward, Maeve Lalor, Tim Brown, Helen Maguire. Twenty years and counting: Epidemiology of an outbreak of isoniazid-resistant tuberculosis in 1995-2014 *Currently reviewing minor revisions for Eurosurveillance*.

Suzan CM Trienekens, Richard G Pebody, Punam Mangtani, Paul R Cleary. Overrepresentation of South Asian ethnic groups among cases of influenza A(H1N1)pdm09 during the first phase of the 2009 pandemic in England. *Manuscript currently under review with co-authors*.

#### **Conferences**

Suzan Trienekens\*, Catherine Smith\*, Charlotte Anderson, Andrew Hayward, Maeve Lalor, Tim Brown, Helen Maguire. Twenty years and counting: Epidemiology of an outbreak of isoniazid-resistant tuberculosis in 1995-2014. TEPHINET 2015 Conference, Mexico City

Suzan Trienekens, Florien Oudenaarden, Luc Nduhirubusa and Annick Lenglet. Novel use of community-based surveillance with integrated cross-sectional surveys to identify health priorities in Mtendeli Refugee camp, Tanzania, February-March 2016. ESCAIDE 2016 Conference, Stockholm