



EPIET REPORT



Summary of work activities

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

Background

Pre-fellowship short biography

Prior to EPIET, Giovanna Ciaravino worked three years in Rome at the National Health Institute (Istituto Superiore di Sanità, ISS), Department of Veterinary Public Health and Food Safety. While working at ISS, she collaborated on surveillance activities and outbreaks investigations carried out at the Division of Veterinary Epidemiology and Risk Analysis, focusing on scrapie and BSE in sheep and goats as well as on food- and waterborne diseases and zoonoses, in particular verocytotoxin-producing *Escherichia coli* (VTEC) and *Salmonella* spp. Before joining the ISS, Giovanna had worked for one year at the Istituto Zooprofilattico Sperimentale delle Venezie (IZSVe) in Padua and also participated in a cooperation project as volunteer. Giovanna graduated from the University of Bologna with a degree in Veterinary Medicine and subsequently completed a master's degree in International Veterinary Cooperation and a specialisation degree in Animal health, animal breeding and zootechnical productions.

EPIET assignment

On 19 September 2011, Giovanna Ciaravino was assigned to the National Centre of Epidemiology of the Carlos III Institute, Madrid, Spain.

Fellowship projects

Surveillance project

Development of a new epidemiological tool for a veterinary-based syndromic surveillance pilot programme: a predictive model based on bovine mortality data

Project leader: Gregorio Jose Torres Peñalver (Ministerio de Agricultura, Alimentación y Medio Ambiente)

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Stockholm, May 2014

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Rationale: Early detection of the infectious disease incursion is of paramount importance to minimise the impact of outbreaks in livestock. Syndromic surveillance based on analysis of already available data combined with traditional surveillance system can help veterinary authorities to react in a timely manner. Establishing appropriate risk signal threshold is a limiting factor of the predictive models. It needs to be adjusted according to the experience gained during the implementation. The epidemiological interpretation of the non-specific risk signals requires the complementation with other sources of information to increase the sensitivity and specificity of the predictions.

Purpose: The aim of this collaboration was to develop a predictive mathematical model using bovine mortality data as a tool for detection of significant variations in cattle mortality and for generation of automatic alerts. All the activities were carried out in the framework of a pilot project for the implementation of a veterinary-based syndromic surveillance system in Spanish bovine population. Firstly the model was run in one specific area of Toledo Province. After a performance evaluation of the system, it will be discuss if extend it to others areas and others species.

Bovine mortality predictive model: a new tool for veterinary-based syndromic surveillance^{1,2}

Background: Mortality monitoring is instrumental in the early detection of disease introduction, provides guidance for risk-based surveillance programmes, and facilitates the timely assessment of the impact of veterinary and public health threats, thus providing information for decision-making. The use of syndromic surveillance increased as new information systems make it possible to exchange data in near-real time. The objective of our study was to model an unspecific mortality baseline in cattle in order to identify excess mortality and generate alert signals.

Methods: This study covered a specific area of Spain. Data were obtained from the State Agency of Agricultural Insurance and the National Registry of Farms databases. Individual death records included information on date of carcass removal, animal ID, farm ID, and production type. We analysed cattle weekly mortality from 2005–2010. Specific mortality baseline was estimated for dairy cows, suckler cows, and fattening calves. Data variability was stabilised by applying a Box–Cox transformation. A Serfling model, adjusted by minimum least squares, was used to analyse trend and seasonality. We considered three thresholds (CI 80%, 90%, 95%) to establish low, medium and high risk signals. A CUSUM algorithm was used to quantify short-term deviations from expected mortality.

Results: Models showed significant six-months cycles, peaking in spring and autumn. In the study period, 28 signals were detected: 14 low, 3 medium and 11 high risks. Four signals were observed in calves, 12 in dairy and 12 in suckler cows.

Conclusions: This system considering different risk thresholds allows for the easy classification of signals. We are working with veterinary authorities to verify the generated signals, assess model performance with 2011 data, and extend this model to other Regions in order to strengthen traditional surveillance systems.

Status: Completed. Co-authored scientific publication (draft).

Daily mortality monitoring in Spain

Rationale: An association between elevated temperatures and mortality has been reported since the early 20th century. The effect of elevated temperature on mortality is a public health threat of considerable magnitude. Every year, a large number of hospitalisations and deaths occur in association with exposure to elevated ambient temperatures. The actual magnitude of heat-related mortality may be greater than reported, since heat-related deaths are not well defined and heat is usually not listed on death certificates as causing or contributing to death.

In 2004, after the 2003 heat wave, daily mortality monitoring from June to September was introduced in Spain. The Spanish Daily Mortality Monitoring (MoMo) system collects all-cause death notifications from computerised district civil registries in order to detect and measure excesses of mortality in real time, indicating eventual public health events, and monitoring mortality in periods of excessive temperatures.

The development of the Spanish MoMo system was supported by the Ministry of Health, with the agreement of 17 Autonomous Communities. The Spanish MoMo joined Euro MoMo at its creation in 2008. The National Center of Epidemiology (CNE) of the Instituto de Salud Carlos III is responsible for the system, which receives data from the Ministry of Justice, the National Institute of Statistics, and the Agencia Estatal de Meteorología (AEMET).

Every day, the Ministry of Justice sends an electronic file containing all death notifications from the previous 15 days from computerised civil registries to the National Centre for Epidemiology. Automated time-series analysis detects mortality excesses, which are then communicated to the authorities for assessing causes and implementing measures.

In 2012, the system collected data from 2462 computerised district civil registries across the Country, covering 81% of the population. MoMo compared observed daily mortality with the expected mortality estimated from the 2004–2010 data series. The upper limit of the 99% confidence interval is used as a threshold to detect excess in the observed mortality and generate warning signals.

Collaboration in drafting the Annual Daily Mortality report for 2012 (1 June–15 September): Informe de evolución de la mortalidad diaria 1 de junio –15 de septiembre 2012

Giovanna was involved in routine surveillance activities (data reporting and alert monitoring) and participated in the drafting of the annual report (description of results and discussion).

Status: Completed

Investigation of a warning signal for excessive mortality in the Autonomous Community of Madrid

Giovanna was included in the investigation teams for the verification of the warning, providing support for analytical epidemiology (time-series analysis of mortality in Madrid by age groups) and collaborated with the Health Authority of Madrid in order to assess a predictive model on unspecific mortality data.

Status: Completed

Epidemiological characterisation of varicella-zoster virus infection in Spain, 1998–2012: analysis of surveillance data and hospitalisations to evaluate the impact of vaccination programme

Rationale: In late 2005, the Spanish Ministry of Health recommended varicella vaccination for adolescents (10–14 years) without history of disease or previous vaccination. In disagreement with the official national recommendation, the Spanish Paediatric Association also recommended the vaccination of toddlers. Between 2006 and 2008, two Autonomous Communities (Madrid and Navarre) and two Autonomous Cities (Ceuta and Melilla), introduced the universal childhood varicella immunisation, vaccinating toddlers and susceptible adolescents. Uncertainties about the possible consequences of universal childhood vaccination on varicella epidemiology are the reasons behind the existence of different vaccination policies. This strategy may cause a shift in the age at infection, leading to an increase of severe cases. Moreover, concerns exist on the possible increase in herpes zoster incidence due to the reduction of immunological boosting from circulating wild-type virus. A monovalent varicella vaccine has been available in Spanish pharmacies since 2004; until early 2013, the vaccine was sold on a prescription basis for private consumption.

Purpose: Analysing surveillance data and national hospitalisation discharge data we wanted to describe the characteristics of varicella and herpes zoster disease in the general population and by age groups during 1998–2012 and assess the short-term impact of vaccine introduction on the epidemiology of varicella and herpes zoster diseases.

Impact on varicella incidence, five years after vaccine introduction in Spain, 2006–2011³

Background: Spain introduced varicella vaccine in 2005. Fifteen of 19 Regions implemented a vaccination scheme with one dose for susceptible children aged 10–15 years (scheme A) to prevent severe cases. The last four Regions also vaccinated 15-months-old toddlers with one dose (scheme B) to interrupt transmission. We assessed the impact of vaccination on varicella rates nationwide and in two regions that use different schemes.

Methods: We analysed varicella cases reported to the National Surveillance Network during 1998–2011 at the national level and in Catalonia (19% of cases, scheme A) and Madrid (18% of cases, scheme B). We stratified analyses for the pre- (1998–2004) and post- (2006–2011) vaccination periods. We calculated varicella incidence rates (IR) by period and period incidence rate ratios (IRR) adjusted by Regions, using negative binomial regression.

Results: We included 1300476 cases of varicella in the first period and 853793 in the second. National varicella IR decreased from 10.5/100000 (95% confidence intervals (CI):10.2–10.9) in 1998–2004 to 7.2/100000 (95% CI 7–7.4) in 2006–2011 (post-vaccination Region-adjusted IRR: 0.89, 95% CI 0.83–0.96). In Catalonia under scheme A, varicella IR did not differ before (8.34; 95% CI 7.65–9.08) and after (8.83; 95% CI 8.2–9.46) vaccination. In Madrid, under scheme B, IR decreased from 14.3/100000 (95% CI 13.0–15.5) in 1998–2004 to 4.9/100000 (95% CI 4.3–5.5) in 2006–2011 (IRR: 0.35, 95%CI0.31–0.4).

Conclusion: Results of analysis in two Regions suggest that vaccinating toddlers against varicella decreases rates, while vaccinating only adolescents has no impact on incidence. Further studies should examine the impact of vaccination on the incidence by age group and on varicella-related hospitalisations at national and regional levels.

Status: completed. Considering the possibility of preparing a manuscript to be submitted to a peer-reviewed journal.

Impacto de las diferentes estrategias de vacunación en la incidencia de varicela. España, 2006–2011⁴

Background: En España se recomienda la vacuna de varicela en adolescentes susceptibles entre 10 y 14 años desde el año 2005, con el objetivo de reducir la severidad de la enfermedad. Además, 4 Comunidades incorporaron la vacuna también en menores de dos años para interrumpir la transmisión. Con este estudio evaluamos el impacto de las dos estrategias de vacunación en la incidencia general y por edades

Methods: Analizamos los casos de varicela declarados a la Red Nacional de Vigilancia entre los años 1998–2011, definiendo el periodo pre-vacunación (1998–2004) y el post-vacunación (2006–2011). Calculamos la tasa de incidencia (TI) por periodo y por estrategia de vacunación y la razón de incidencias (RTI) de periodo por estrategia. La TI por grupos de edad se calculó utilizando los casos notificados entre los años 2007–2011 en 8 Comunidades Autónomas. La RTI por estrategia y edades se evaluó comparando el 2008–2009 y el 2010–2011. Las RTI han sido calculadas utilizando una regresión binomial negativa y ajustando por comunidades

Results: El periodo pre-vacunación incluye 1.300.476 casos y el post-vacunación 853.793. La información de la edad estaba disponible en 274.830 casos. A nivel nacional la TI anual ha disminuido desde 548/100.000 (IC 95%:504–591) casos en el periodo 1998–2004 hasta 375 (IC 95%:330–420) en el 2006–2011 y la RTI post-vacunación fue 0,9 (IC 95%: 0,8–1). En las CCAA que vacunan solo adolescentes se observó una RTI post-vacunación de 0,8 (IC 95%: 0,7–0,9) mientras la RTI en las que vacunan niños y adolescentes fue de 0,4 (IC 95%: 0,6–0,5). Entre los años 2007–2011, en las CCAA que vacunan solo adolescentes (N=6) se observó un descenso en la incidencia en los grupos de

edad 0–4, 15–24 y 25–34 años y, respecto al 2008–2009, las RTI del periodo 2010–2011 han sido respectivamente de 0,8 (IC 95%: 0,7–0,1); 0,8 (IC 95%: 0,7–0,9) y 0,9 (IC 95%: 0,8–1). En las CCAA que vacunan niños y adolescentes (N=2) la incidencia descendió significativamente en todos los grupos de edad, excepto en los mayores de 45 años [0–4 años RTI: 0,2 (IC 95%: 0,1–0,4), 5–9 RTI: 0,5 (IC 95%: 0,3–0,8), 10–14 RTI: 0,4 (IC 95%: 0,3–0,5), 15–24 RTI: 0,6 (IC 95%: 0,4–0,8), 25–34 RTI: 0,5 (IC 95%: 0,3–1), 34–44 RTI: 0,6 (IC 95%: 0,5–0,9) y ≥45 RTI: 0,8 (IC 95%: 0,5–1,2)]

Conclusion: A nivel nacional, la disminución de la incidencia refleja el efecto combinado de las dos estrategias de vacunación. Vacunar niños y adolescentes reduce la incidencia general con impacto en todas las edades. La vacunación solo en adolescentes no reduce la incidencia general y la leve disminución observada en algunos grupos de edad podría indicar el impacto de la vacunación no cubierta por el sector público y por tanto fuera del control de las recomendaciones de las autoridades sanitarias.

Status: completed.

Impact of different vaccination strategies on the age-specific incidence of varicella in Spain, 2007–2012⁵

Background: Spain included varicella vaccination for 10–14 years adolescents (scheme A) in the national vaccination schedule in 2005. During 2006–2008, four out of 19 Regions also introduced a universal vaccination programme for toddlers (scheme B). In 2007, a national recommendation called for the collection of information on the age of reported cases. We assessed the impact of vaccination schemes on varicella incidence at the national level and on the age-specific incidence in the six Regions that provided information on age during 2007–2012.

Methods: We calculated varicella incidence trends by vaccination scheme at the national level as well as the age-specific incidence trends by scheme for six Regions (four following scheme A and two scheme B) during 2007–2012. Incidence included cases notified to the National Surveillance Network; population data were provided by the Spanish National Statistics Institute. Trends were calculated using Poisson regression models.

Results: At the national level, 814700 cases were notified. We found an annual incidence decrease of 5% (95% CI: 3–8%) and 32% (95% CI: 25–38%) in Regions under scheme A and B, respectively. Information on age was available for 413 004 cases. In the four Regions under scheme A, trends decreased significantly to a mean rate of 8%, 7%, 10% and 6% per year (p-value < 0.01; age groups 0–4, 10–14, 15–24 and 25–34 years, respectively). In the two Regions under scheme B, incidence trends decreased in all age groups, with annual mean reductions of between 23% and 47% (p-value < 0.001).

Conclusion: Our results indicate an incidence reduction in all age groups in Regions under the universal vaccination programme for toddlers. The unexpected incidence decrease observed in Regions vaccinating only adolescents, particularly the reduction in the 0–4-year age group, suggests supplementary immunisation activities not covered by the public sector. We recommend assessing vaccination coverage by Regions to further understand the impact of varicella vaccination in Spain.

Status: Completed

Herpes zoster incidence trends under different varicella vaccination schemes in three Spanish Regions, 2005–2012⁶

Background: Spain introduced varicella vaccination for susceptible adolescents in 2005. As of 2006, four Regions have also opted for the vaccination of toddlers, which lead to heterogeneous changes in varicella incidence trends. After vaccine introduction, herpes zoster (HZ) surveillance was recommended and its implementation is still ongoing. We evaluated HZ incidence trends from 2005 to 2012 in three Regions which use different vaccination policies.

Methods: We included HZ cases notified during 2005–2012 in Madrid (vaccinating adolescents and toddlers with one dose each); Navarra (vaccinating adolescents and toddlers with two doses each), and Murcia (vaccinating only adolescents with two doses). We calculated overall age-adjusted and age-specific incidence trends by Region, using negative binomial regression models.

Results: We analysed 63136 HZ cases. In Madrid, we found no changes in the overall trend between 2005 and 2012 (age-adjusted IRR 1.01; CI 95%: 0.98–1.05), while annual incidence in those aged 15–24 years rose significantly (IRR 1.14; CI 95%: 1.01–1.29). In Navarra, we found a 2% annual reduction in overall incidence (age-adjusted IRR 0.98; CI 95%: 0.96–0.99) and a significant fall in annual incidence in those aged 15–24 years (IRR 0.94; CI 95%: 0.89–0.99) and 45–64 years (IRR 0.96; CI 95%: 0.92–0.99). In Murcia, we found an 8% annual increase across the study period (age-adjusted IRR 1.08; CI 95%: 1.06–1.10), with a significant increase in age-specific incidence of between 6% and 10% in all age groups (p-value < 0.001).

Conclusion: Over the seven-year period after varicella vaccine introduction, HZ incidence showed different trends in the three Regions, decreasing in the Region which vaccinates toddlers and adolescents with two doses, and increasing in the Region which vaccinates only adolescents. We recommend that HZ surveillance systems should be improved and consolidated, that varicella vaccination coverage should be assessed, and that further studies should be conducted to understand if changes in HZ disease are linked to the introduction of varicella vaccine.

Status: Completed

Impact of the introduction of varicella vaccine on varicella-related hospitalisations in Spain⁷

Background: Spain introduced varicella vaccination in 2005 with one dose at 10–15 years of age (scheme A) to prevent severe cases. Four of 19 Regions also vaccinated 15-month-old toddlers with one dose (scheme B) to interrupt transmission. Scheme B was also recommended by private paediatricians. We assessed the impact of vaccination on varicella-related hospitalisations.

Methods: We analysed hospitalisations recorded in hospital discharge datasets 1998–2010 at the national level and in two Regions which used different schemes: Catalonia (15% of hospitalisations, scheme A) and Madrid (15%, scheme B). We stratified analyses for the pre- (1998–2004) and post- (2006–2010) vaccination periods. We estimated incidence rates (IR) by age groups and age-adjusted incidence rate ratios (IRR), using negative binomial regression.

Results: We included 8856 varicella-hospitalised cases in the first period and 6128 in the second. National varicella-related hospitalisation IR decreased significantly in four age groups: from 28.5/100 000 (95% CI 26.4–30.5) to 22/100 000 (95% CI 19.4–24.6) in the 1–4-year age group, from 7.3/100 000 (95% CI 6.5–8.0) to 5.5/100 000 (95% CI 4.9–6.1) in the 5–9-year age group, from 2/100 000 (95% CI 1.7–2.2) to 1.3/100 000 (95% CI 1.4–1.5) in the 25–29-year age group, and from 3.6/100 000 (95% CI 3.3–3.9) to 2.2/100 000 (95% CI 1.9–2.4) in the 30–39-year age group (post-vaccination age-adjusted IRR: 0.91, 95% CI 0.86–0.96). In Catalonia, IR decreased only in the 30–39-year age group: from 7/100 000 (95% CI 3.4–4) to 2.4/100 000 (95% CI 1.7–3) (IRR: 0.86, 95% CI 0.77–0.96). In Madrid, IR decreased in the 1–4-year age group from 37.6/100 000 (95% CI 31.6–43.6) to 14.9/100 000 (95% CI 2.7–27) and from 4.2/100 000 (95% CI 3.5–4.8) to 1.7/100 000 (95% CI 0.7–2.7) in the 30–39-year age group (IRR: 0.65, 95% CI 0.54–0.79).

Conclusion: The results of the analysis suggest that vaccinating toddlers against varicella decreases overall varicella-related hospitalisations while vaccinating only adolescents had no impact. What observed at national level may reflect also the impact of vaccination recommended by the private sector. Further studies should examine the impact of vaccination on incidence by age group and vaccination coverage.

Status: Completed

Herpes zoster hospitalisations in Spain after varicella vaccine introduction, 2006–2011⁸

Background: Spain introduced varicella vaccination in 2005 for susceptible adolescents (scheme A); four Regions also adopted universal infant vaccination (scheme B), leading to a significant decrease in varicella incidence (65% compared with 20% in Regions using scheme A). Different models have predicted the increase of the risk of herpes zoster (HZ) due to the reduction of natural boosters. We assessed changes in HZ hospitalisations six years after vaccine introduction in Regions that show differences in the decline of incidence.

Methods: We analysed HZ hospitalisations from hospital discharge datasets 1998–2011. We defined pre- (1998–2004) and post-vaccination (2006–2011) periods. We estimated overall hospitalisations period rate ratios (HRR) for every vaccination strategy (adjusted by Regions and age) and age-specific period HRR (adjusted by Region), using Poisson regression models.

Results: The total number of cases of HZ hospitalisation for both periods was 13525 cases. Overall, HRR declined by 8% (95% CI 3%–12%). In Regions using scheme A, HZ hospitalisations declined by 8% (95% CI 3%–13%), and we found a significant drop of 29% (95% CI 37%–20%) and 21% (95% CI 27%–14%) in the age groups 25–44 and 45–65, respectively, and an increase of 8% (95% CI 1%–15%) in people older than 64 years of age. In Regions using only scheme B, patients over the age of 65 showed a significant increase of 21% (95% CI 7%–38%); in all other age groups no significant changes were detected.

Conclusions: Six years after the introduction of varicella vaccination in Spain, we observed an increase of HZ hospitalisations in elderly people in regions where the incidence of varicella has been markedly reduced. These results should be interpreted with caution since HZ hospitalised cases represent severe cases. We recommend that HZ surveillance should be enhanced.

Status: Completed

National Varicella Report, Spain 2006–2012

Giovanna was involved in the data cleaning and validation, the data analysis, the interpretation and discussion of results, and in writing the first draft of the report. Surveillance data and national hospitalisation discharge data were presented.

Status: Ongoing

Support activities, Surveillance Unit at the National Centre of Epidemiology

Completeness of the regional surveillance systems for varicella: data analysis of the completeness of the information provided by the Regions which report case-based data.

Status: Completed

Description and comparison of the information provided by the different Regions by means of notification of varicella cases: case-based vs. aggregate reporting

Status: Completed

Collaboration as external author in a Ministry of Health publication

Title: Revisión del Programa de Vacunación frente a la Varicela. Grupo de trabajo varicela 2012–2013. Ponencia del programa y registro de vacunaciones. Enero 2013. Ministerio de Sanidad, Servicios Sociales e Igualdad.

Support the data analysis and interpretation of results, with particular reference to the third chapter of 'Situación de la varicela en España, 1998–2011'.

Purpose: In order to establish proper recommendations for varicella vaccination in Spain and propose measures to ensure compliance with these recommendations, the aim of this document was to review the recent epidemiological data on varicella in Spain, assess changes in the epidemiology of the disease linked to childhood vaccination, evaluate the vaccination programmes in place at the regional level and update the knowledge on availability and consumption of varicella vaccines in Spain. A review of studies on the economic evaluation of varicella vaccination is also presented.

Status: Completed

Collaboration in the analysis of pneumococcal pneumonia hospitalisation-related data. Co-authored scientific communications

Decreased hospitalisations due to pneumococcal pneumonia in children in two Regions of Spain (Madrid and Catalonia), following the introduction of the 13-valent pneumococcal conjugate vaccine (PCV13)⁹

Background: In Spain, the heptavalent pneumococcal conjugate vaccine (PCV7) was introduced in 2001 and replaced by the 13-valent PCV13 in 2010. Only the Autonomous Region of Madrid included the vaccine in the childhood vaccination programme (CVP) (2006–2012). In the absence of nation-wide surveillance of pneumococcal disease, we assessed the impact of different vaccination policies on the burden of pneumococcal pneumonia.

Methods: We obtained all hospitalisations due to pneumococcal pneumonia in children below five years of age from 2002–2011 in two Spanish Regions, Madrid and Catalonia. We compared hospitalisation rates in both Regions during three periods: (A) 2002–2006, before Madrid included the PCV7 vaccine in the schedule; (B) 2007–2009, after its inclusion; and (C) 2010–2011, after its replacement by PCV13. We calculated rate ratios (RR) using Poisson regression models.

Results: Overall, 3337 hospitalisations met the selected criteria. The hospitalisation rates among 0- to 4-year-olds did not decrease between periods A and B, neither in Madrid (RR1.33; 95% CI 1.19–1.50) nor in Catalonia (RR0.99; 95% CI 0.90–1.10). Comparing period C with B, the hospitalisation rates decreased by 57% (RR0.43; 95% CI 0.25–0.74) and 60% (RR0.40; 95% CI 0.33–0.47) among <1- and 1- to 4-year-olds in Madrid, and by 26% (RR0.74; 95% CI 0.46–1.22) and 29% (RR0.71; 95% CI 0.62–0.82) in Catalonia, respectively.

Conclusions: Vaccination with PCV7 did not reduce hospitalisation rates due to pneumococcal pneumonia among children under five years of age. However, the introduction of PCV13 may have resulted in a decrease of hospitalisations in Madrid, but also in Catalonia, where the vaccine was administered privately. Further evaluations are required (including cost-effectiveness studies) to inform the potential inclusion of PCV13 in the CVP all over Spain.

Status: Completed

Outbreaks

A suspected outbreak of *Yersinia enterocolitica* serotype O:3 in Albacete Province, Castilla la Mancha Region, Spain. December 2012–January 2013

On 29 January 2013, the department of epidemiology of Castilla La Mancha Region contacted the National Epidemiology Centre of the Carlos III Health Institute to communicate the detection of a suspected cluster of *Yersinia enterocolitica* infections in Albacete Province. We were asked to support the outbreak investigation and response. A total of seven cases of *Y. enterocolitica* serotype O:3 were reported by the laboratory between 26 December 2012 and 17 January 2013. The onset of symptoms of the first case was 21 December. A multidisciplinary team was set up, including the veterinary sector and the National Microbiology Centre. A trawling questionnaire was developed to investigate the cases. No epidemiological links were identified among cases. The microbiological analysis revealed that patients were infected with different strains. On 14 February 2013 the investigation was closed and the suspected outbreak was not confirmed.

Status: Completed

Research

Clinical and epidemiological characterisation of malaria in an endemic area of Equatorial Guinea (Bata District, Continental Region)

Project Leader: Fernando Simón Soria (Ministerio de Sanidad, Servicios Sociales e Igualdad)

The aim of the project (described in the general strategic document) is to define clinical and epidemiological characteristics of malaria in an endemic area of Equatorial Guinea in order to guide possible control actions, to implement prevention programmes, and to generate future research topics.

Different units and research teams, joining the Tropical Disease Cooperative Research Network (*Red de Investigación Cooperativa en Enfermedades Tropicales – RICET*) are involved in this project, including virologist, entomologist, clinicians, epidemiologist, statistician and sociologists.

Specific project objectives:

- Estimate malaria prevalence in a population with high-transmission levels
- Define clinical symptoms and establish a specific case definition for the study area according to the local malaria parasitaemia level
- Describe the immunological characteristics of the local population
- Characterise circulating strains of *Plasmodium falciparum*
- Characterise circulating species of *Anopheles* and the transmission level
- Study knowledge, attitudes and practices of the local population regarding malaria

Activities in the framework of the project:

- Participation in writing the Project Strategy Document
- Participations for drafting the questionnaire
- Responsibility for writing the study protocol: estimation of malaria prevalence in Bata District and its association with socio-demographic, socio-economic and environmental factors

Status: Study protocol finished, project activities ongoing

Economic evaluation of the introduction of vaccination against serogroup B meningococcal disease in Spain

Status: Planning. Possible collaboration with RIVM under evaluation

Scientific communication

- One poster presented at the 13th ISVEE Conference¹
- One oral communication presented at ESCAIDE conference 2012³
- One poster accepted at ESCAIDE conference 2013⁶
- Two oral communications accepted: *Congreso Ibero-Americano de Epidemiología y Salud Pública y Reunión Científica anual de la Reunión Científica de la Sociedad Española de Epidemiología (SEE)*⁴ and ESCAIDE Conference 2013⁵

Teaching experience

Time-series analysis

Participation in a one-week module on TSA in epidemiology held at the Spanish National School of Public Health in Madrid. Activities included a combination of presentation (lecture *Ejemplo práctico del análisis de una serie temporal de mortalidad general bovina*), group discussions, and facilitation of working groups.

Epidemiology

Ten one-hour lectures during the 'Epidemiology and Statistics in Public Health' module (1–22 October 2012) leading to the *Diploma Superior de Salud Pública Internacional*, Spanish National School of Public Health in Madrid. The activities included a combination of presentations, group discussions, and facilitation of group exercises.

Other

- Oral presentation at the Spanish Field Epidemiology Training Program (PEAC) Annual Conference (Impacto en la incidencia de la varicela 5 años después de la introducción de la vacuna en España, 2006–2011)
- Involvement in activities related to the surveillance system for daily mortality in Spain and collaboration in writing the annual national report for 2012.

- Modules attended:
 - Module on geographical information systems (GIS) in public health (18 hours), held at the Spanish National School of Public Health in Madrid
 - Module on application of time-series analysis methods in public health (25 hours), held at the Spanish National School of Public Health in Madrid

Supervisors' conclusions

During her two-year fellowship at Instituto de Salud Carlos III in the Spanish Field Epidemiology Training Programme, Giovanna Ciaravino has participated in numerous projects, including applied research, outbreak investigation, and particularly in epidemiological surveillance and evaluation of public health interventions. Giovanna has demonstrated that she can quickly grasp the nature of a problem and identify the adequate methodological approaches to remedy the situation. This, together with Giovanna's capacity for epidemiological analysis and interpretation of results, contributed significantly to the successful progress and completion of her studies. The official reports she produced were very useful and helped the decision-makers at both the Ministry of Health and the Ministry of Agriculture.

Giovanna is a serious and hard-working professional, able to work both independently and as part of a team. Her contributions to discussions are always constructive and to the point. We can strongly recommend Giovanna Ciaravino for any kind of position related to public health.

Next steps

After completion of her fellowship, Giovanna would like to continue working in the field of infectious disease epidemiology and public health.

References, list of the publications and communications

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