



FELLOWSHIP REPORT

Summary of work activities

Ying-shih Su Cohort 2015

Background

Pre-fellowship short biography

Prior to EPIET, Ying-shih Su was working as a medical doctor in Taiwan, specialized in infectious disease and infection control. He is currently pursuing his Doctor of Philosophy (PhD), concentrating on pharmacology and toxicology in Taiwan. Ying-shih worked in Taiwan Centers for Disease Control as a medical officer since 2013.

FETP assignment

On 16th September 2015, Ying-shih Su was assigned to the Department for Infectious Disease Epidemiology, at the Austrian Agency for Health and Food Safety (AGES), Vienna, Austria, under the supervision of Dr. Daniela Schmid. He had one EPIET frontline coordinator, Lisa Hansen (May 2016- -September 2017). This report summarises the work performed during the fellowship.

Fellowship portfolio

This portfolio presents a summary of all work activities (unless restricted due to confidentiality regulations) conducted by the fellow during the ECDC Fellowship, EPIET path. These activities include various projects, and theoretical training modules.

Projects included epidemiological contributions to public health event detection and investigation (surveillance and outbreaks); applied epidemiology field research; teaching epidemiology; summarising and communicating scientific evidence and activities with a specific epidemiology focus. The outcomes include publications, presentations, posters, reports and teaching materials prepared by the fellow.

This portfolio also includes a reflection from the fellow on the field epidemiology competencies developed during the 2-year training, a reflection from the supervisor on the added value of engaging in the training of the fellow, as well as a reflection by the programme coordinator on the development of the fellow's competencies.

The views expressed in this publication do not necessarily reflect the views of the European Centre for Disease Prevention and Control (ECDC).

This portfolio does not represent a diploma. Fellows receive a certificate acknowledging the 2-year training and listing the theoretical modules attended. Additionally, if all training objectives have been met, they receive a diploma.

Stockholm, September 2016

Fellowship projects

1. Surveillance

Potential Alternative Systems for Supplementing Seasonal Influenza Surveillance in Austria

Background

Austria's influenza surveillance system consists of the sensitive syndromic sentinel surveillance of community cases who attend GPs and pediatricians, and the specific laboratory surveillance for analysis of sentinel- and non-sentinel samples. The influenza surveillance system in Austria was evaluated in 2011, and identified shortcomings including low representativeness in terms of place and demographics, discontinuous reporting during the holiday season, and lack of information on severe cases.

Methods

The current influenza surveillance systems in Austria were described in terms attributes and data sources. Based on the former needs assessment, we conducted a systematic review of influenza surveillance systems in other EU countries and Taiwan, in order to propose improvements to the current surveillance and options for a new complementary surveillance system.

Results

According to the previous surveillance evaluation, the ILI surveillance system lacks representativeness of ILI occurrence by province, considering that 6 of 9 provinces are not represented in this surveillance system and that the three sentinel surveillance regions mainly represent urban populations. The representativeness of syndromic sentinel surveillance needs to be improved by recruitment of GPs in rural area and encouraging better coverage. The existing surveillance systems only monitor mild ILI and ARI. A hospital-based surveillance system to complement surveillance of outpatient sentinel surveillance system would allow capturing cases of severe acute respiratory illness (SARI). The options for new hospital surveillance include continuous syndromic surveillance, based on the surveillance of ICD-10 code in sentinel hospital as in Germany. The alternative is to use the hospitalized cases in intensive care units as is done in UK.

Conclusions

In this study, we describe the weaknesses of the current influenza surveillance systems. Strengthening the systems by expanding GP participation could enhance the quality of influenza epidemiologic and laboratory data and strengthen Austrian capacity for seasonal influenza detection and prevention. We also recommended the introduction of mandatory notification of hospitalized SARI cases in intensive care, as a feasible measure that would address the lack of information on severe cases. Pilot study may start in flu season 2017/2018.

Role and outputs: co-investigator

Ying-shih Su reviewed the previous surveillance evaluation(1) and current literature and prepared a presentation for the Ministry of Health(2).

Supervisor(s): Elisabeth Kanitz, Daniela Schmid, AGES

Competencies developed:

Reviewing different countries' influenza system and trying to design alternative surveillance systems was an interesting project. I got to know a lot of different surveillance systems and the literature. I learned the skills of describing the public health importance of the health related event under surveillance, comparing attributes of the systems and how to make recommendation. I better understand the importance of an adequate surveillance objective and the challenge of choosing one system for the country. I also learned a lot about influenza surveillance systems in the world and will use this knowledge in the future to write project for it.

2. Outbreak investigations

Salmonella Senftenberg outbreak in Austria, 2016

Background:

On April 6th, 2016, the national Reference Laboratory for Salmonella reported a suspected, Austrian-wide outbreak caused by *Salmonella* (S.) Senftenberg to the Ministry of Health. The investigation aimed to confirm the outbreak, to identify the mode of transmission and to implement appropriate preventive measures.

Methods

A probable outbreak case was defined as a person who is a resident of Austria with no history of travel in 72 hours prior to onset, who had a laboratory-confirmed infection with *S. Senftenberg* after December 2015 and who had an epidemiological link to a confirmed outbreak case. A confirmed outbreak case fulfilled the criteria 1 and 2 of a probable outbreak case and was part of the outbreak "Cluster Tirol" by multilocus sequence typing. We conducted trawling interviews, followed by a case-control study with 22 WGS-confirmed cases and 44 controls matched by age, sex and postal code.

Results

Case definitions were fulfilled in 34/38 cases registered at the NRLS between December 2015 and June 2016 and included 8/9 Austrian provinces. Illness was associated with purchasing raw chicken at supermarket chain 1 (matched odds ratio, 4.1; 95% confidence interval [CI], 1.1 to 15.4) and purchasing raw chicken at supermarket chain 2 (matched odds ratio 3.9, 95% CI 1.0 to 15.1). Three specimens from one poultry-slaughtering facility tested positive for *S. Senftenberg* between January and April 2016. Trace-back analyses revealed that this poultry-slaughtering facility had delivered fresh chicken meat to supermarket chains 1 and 2. Furthermore, WGS analyses showed that these 3 food isolates were part of the human outbreak "Cluster Tirol". A recall of chicken meat was not implemented due to the fact that no human illnesses had been reported in the previous 6 weeks.

Conclusion:

This outbreak documents the first *S. Senftenberg* outbreak registered in Austria. Utilization of WGS showed that there were far more cases which could be attributed to the outbreak than with using traditional PFGE methods. In addition, results from the WGS analysis of food specimens that tested positive for *S. Senftenberg* support the results from the analytical epidemiological study.

Role and outputs: Co-investigator

Ying-shih assisted/collaborated in developing the questionnaire and performed data entry. The output is written report by Sabine Maritschnik(3).

Supervisor(s): *Dr. Daniela Schmid, AGES*

Competencies developed:

Being involved in this project, I learned to use Epi-info to design the questionnaire for this outbreak investigation. Also, it was a good opportunity to refresh my knowledge on *Salmonella Senftenberg*.

A *Salmonella Enteritidis* outbreak in Austria, July 2017

Background

A multi-country outbreak of *Salmonella Enteritidis* phage type(PT) 56 with multiple locus variable-number tandem repeat analysis(MLVA) profiles 2-12-3-3-2 is currently ongoing in the EU/EEA. Based on Whole Genome Sequencing (WGS), isolates are part of five distinct but related genetic clusters.

Methods:

A probable outbreak case was defined as a person who is a laboratory-confirmed *Salmonella Enteritidis* case with symptoms onset on or after 1 January 2017 and fulfilling the following laboratory criterion: (1) with a linked isolate of MLVA profile 2-11-3-3-2; or 2-12-3-3-2, or who (2) with a linked isolate that after WGS analysis belong to the 10 SNP single linkage cluster 1.2.3.151.151.% (t10:151). A confirmed outbreak case fulfilled the laboratory criteria with an isolate from a clinical specimen that by WGS analysis belong to one of the 5-NP single linkage cluster (t5 cluster), 1.2.3.151.151.(t5:151) or 1.2.3.151.718(t5:718), or 1.2.3.151.151.783(t5:783).

Results

As of 17th July 2017, there are 3 confirmed cases and 2 probable cases in Austria. 4 cases are females (75%). And the median age is 17 years. 4 cases had travel history.

Conclusion

There is one reported isolate belonging to the outbreak genetic cluster without history of travel abroad in 2017. This is suggestive that there may be a circulation of vehicles of contamination in Austria.

Role and outputs: co-investigator

Ying-shih assisted/collaborated in developing the epi-curve, the disease outbreak map and wrote the draft report (4).

Supervisor(s): Elisabeth Kanitz, Dr. Daniela Schmid, AGES

Competencies developed:

I learned to use R for spatial analysis of the disease outbreak. I undertook a rapid review of EC Regulation on the control of salmonella and other specified food-borne zoonotic agents This was my first experience in writing an epidemiological situation report in Austria.

3. Applied epidemiology research

Outpatient antibiotic usage in Austria – a first comparison of sales and insurance reimbursement data, 2012-15

Background:

According to the most recent European report on antibiotic consumption, based on insurance reimbursement data (RD), total antibiotic consumption in Austria in 2012 was below the average of 30 European countries. The aim of this study was to characterize systemic outpatient antibiotic usage in Austria, using sales data (SD) to assess the reliability of RD in estimating outpatient antibiotic usage, needed to monitor observed antibiotic resistance.

Method

SD and RD for 2012-2015 were provided by IMS Health and the Austrian social insurance fund, respectively. Antibiotic quantities were standardised using defined daily dose per 1000 inhabitants per day (DID), in accordance with the anatomical therapeutic classification (ATC). We analysed antibiotic usage by substance level (ATC level 5) and year, and compared DID estimates from the two data sources.

Result

Outpatient antibiotics usage estimates based on SD and RD were 19 and 14 DID in 2012 (SD-RD difference: 25%), 20 and 17 DID in 2013 (17%), 18 and 14 DID in 2014 (23%), and 19 and 14 DID in 2015 (24%). The greatest deviations between SD and RD were observed for sulfametriaxol+trimethoprim (25-fold higher), sulfametrole+trimethoprim (6-fold), amoxicillin (3-fold) and ciprofloxacin (3-fold). Based on SD, the annual median DID of the most-used antibiotics from 2012 to 2015 were amoxicillin/enzyme inhibitor (4.5, IQR 4.4-4.6), amoxicillin (2.3, 2.3-2.4), ciprofloxacin (1.73, 1.72-1.73), clarithromycin (1.6, 1.5-1.7) and doxycycline (1.2, 1.1-1.2).

Conclusion

From 2012 to 2015, antibiotic usage estimates from sales data were consistently higher than RD. As RD do not include antibiotics priced below the eligibility threshold for reimbursement, the use of RD alone will underestimate true outpatient antibiotic consumption in Austria. We recommend using both sources of information for prospective surveillance of antibiotic consumption.

Role and outputs: Co-investigator

Ying-shih wrote the protocol, cleaned and managed the raw data, performed analysis and wrote a report. An abstract on this study was accepted for a poster presentation at ESCAIDE 2017 (5).

Supervisor(s) : *Elisabeth Kanitz, Dr. Daniela Schmid, AGES*

Use of antibiotics in Austria / Antibiotikaeinsatz in Österreich

In 2015, 119.2 t of active ingredients of antibiotics were used in Austria in human medicine (70.4 t; 59.1%), for food animals (48.8 t; 40.9%) and in plant production (0.002 t; < 0.1%). During the last five years, consumption of antibiotics increased in human medicine by 3.8% (2011: 67.8 t; 2015: 70.4 t). In hospitals, it increased by 17.3%, from 19.7 t in 2011 to 23.1 t active ingredients in 2015. In the community, measured in kg active ingredient, it increased by 0.3% from 2011 to 2015. Consumption in defined daily dose (DDD) per 100,000 inhabitants per year decreased by 3.6%. Our numbers for the community (2015: 17.0 DDD) contradict AURES reports and a recent ECDC report, which claim a consumption of 14.0 DDD/1000

Role and outputs: Co-investigator

Ying-shih helped to review the articles of antibiotics consumption and assisted/collaborated the data cleaning. An journal article was written and accepted by Die Bodenkultur: Journal of Land Management, Food and Environment.(6)

Supervisor(s) : *Dr. Franz Allerberger*

Competencies developed:

It was a great opportunity to understand the trends of antibiotics use. It also helped me to consolidate my technical skills on the management of big datasets using R (i.e. data cleaning, recoding and reforming). By working on this project, I learned how to calculate defined daily dose in different drugs, including combinations and calculate the linear regression in R. This knowledge will help me design a study of antibiotics consumption in the future.

4. Communication

Provide a list of publications, unpublished and published manuscripts, reports, book chapters, and conference presentations in Vancouver style.

Manuscripts submitted to peer reviewed journals (in review process)

Conference presentations

Oral Presentation "Dogemon" in the Hackathon, International Meeting Emerging Disease, 2016 and won the ProMEDAward.(7)

Team Name: Dogemon

Team Member Names: Howard Gobble, Claudia Kohl, Min-Hau Lin, Ying-shih Su, Hanna Castro

Team Contact: Hanna Castro

Team Contact email address: hanna.castro@helsinki.fi

The objective of DOGEMON is to facilitate rabies eradication programs through community engagement. DOGEMON will operate in areas where ongoing dog vaccination programs are in place. Our idea consists of a fun, educational and easy-to-use mobile phone app "DOGEMON", which would engage community members to identify and report unvaccinated dogs in the area to local veterinarians and vaccination teams. Dog identification is gamified to incentivize use of the app.

How it works:

When a community member sees an unvaccinated dog (a dog without a collar/other indicator of rabies vaccination), he/she would take a photo of the dog with their mobile phone and register the photo and GPS coordinates through the DOGEMON app. The local veterinarian or vaccination team would use this data to evaluate the number of unvaccinated dogs in each area and to plan field vaccinations. As reported dogs get vaccinated, the veterinarian would designate the dog as vaccinated and record the time of vaccination in the DOGEMON app.

DOGEMON will be advertised through local media together with an educational message on the importance of dog vaccination for rabies prevention and the welfare of the whole community. In addition, the DOGEMON app itself would provide rabies information to users with the aid of pictures and diagrams. Finally, the DOGEMON app will evolve to feature a donation program where users internationally could view photos of unvaccinated dogs and donate to their vaccination.

The poster of "Outpatient antibiotic usage in Austria – a first comparison of sales and insurance reimbursement data, 2012-15" was accepted in ESCAIDE, 2017(5)

Reports

Assisted in 2 outbreak reports and 1 surveillance report

Other

5. Teaching activities

Title: Case study facilitation: Giardiasis in Bergen, Norway

Ying-shih delivered the case study during 2 sessions of 1.5 hours each at the Medical University of Innsbruck on the 21st, 22nd, 24th, and 25th of November 2016. Twelve 3rd-4th year medical students took part in the case study. The material for the case study was already available prior to the start of the teaching activity.

Supervisor(s): Peter Kreidl (University of Innsbruck)

Educational outcome:

To be a facilitator this time helped me to act as a facilitator in a case study. Learning how to encourage the students to answer an open-ended question or develop a solution to an open-ended problem with multiple potential solutions. I also learned to guide discussion with questions that move students from problem identification to solutions.

6. Other activities

Other activities/missions

Rapid needs assessment at Elliniko refugee camps in June 2016, Athens, Greece

During the Rapid Assessment & Survey Methods module in Athens (20-25.06.2016), I joined the investigation of refugees vaccination programs and the available medical clinics inside and outside of the refugee camps in Elliniko, Athens. Our team was lead by Dr.Aftab Jasir. This initiative was part of the Médecins Sans Frontières (MSF) program.

Background: In early 2016, MSF-Operational Centre Geneva (OCG) launched support activities in the three refugee camps of Elliniko (3,612 individuals of mostly Afghan origin) in the metropolitan area of Athens. MSF-OCG considered different service provision options and planned to conduct a vaccination campaign among refugees hosted in the three camps. We aimed to assess the health (medical/surgical support, chronic diseases) and sanitary needs of the refugees and to estimate the baseline measles/measles-mumps-rubella (MMR) vaccination coverage among under 15 years of age, in order to provide recommendations to the local health stakeholders.

Methods: On 24 July 2016, we conducted a rapid needs assessment survey among a random sample of refugees residing in the camps in Elliniko. Assuming a prevalence of 50% for health conditions, precision of ± 0.07 and a 10% non-response, we estimated a required sample of 205 individuals. The number of participants by camp was proportional to the camp size. In two camps, we used systematic sampling to select tents and in the third camp, we used simple random sampling. We interviewed one randomly selected individual above the age of 15 from each selected tent and collected information on demographics, access to health care, chronic diseases, trauma/injuries, surgery and post-operative care for trauma/injuries, pregnancy in women, availability of non-food items, safety, anxiety, priority needs, future plans and MMR vaccination status of children under 15 years. We calculated weighted proportions using the number of people per tent as weights and adjusted for clustering for the vaccination coverage estimate; a cluster was defined as a single shelter.

Results: We included 214 individuals in the analysis; median age was 27 years (range 15-75); 50% were male. Of interviewed individuals, 44 (23%) reported having at least one chronic disease. Of those, 12 (30%) reported having high blood pressure, 12 (30%) heart and 11 (28%) kidney diseases. Among those with these pathologies, 50%, 68% and 83% reported not taking the appropriate treatment, respectively. Of all respondents, 106 (51%) reported not having adequate access to soap and 157 (59%) to clothes- washing. Regarding safety, 90 (43%) of responders did not feel safe within the environment of the camp and 80 (38%) had endured an unsafe event since arriving in the camp. Of all respondents, 168 (83%) felt anxious or depressed. Vaccination against measles/MMR was known for 220 of the 348 (63%) children <15 years of age. Among those, 15 (6.8%) were vaccinated based on vaccination records and 168 (76%) based on parental/guardian recall.

Conclusions and recommendations: This assessment indicated low access to proper care for chronic diseases with the majority of respondents reporting not taking appropriate treatment. It also indicated insufficient hygiene conditions in the camps, with limited access to basic hygiene material. Refugees in Elliniko camps need to be provided with sufficient access to chronic disease and psychosocial care and sufficient hygiene material.

Conferences attended

- ESCAIDE, Stockholm, Sweden, 11th -13th November 2015
- ESCAIDE, Stockholm, Sweden 28th -30th November 2016
- IMED Hackathon, Vienna, Austria, 3rd -5th, November, 2016 and **won the ProMed Award**
- ECCMID, Vienna, Austria, 22nd - 25th, April, 2017

Additional trainings

1. Introduction course of R in Datacamp
- **Basic Security in the Field II** and **Advance Security in the field**, United Nations Department of Safety and Security (UNDSS) online courses, **certificates acquired** on 3 October 2016 and 7 October 2016)
- Completed the online course of intermediate R and time series analysis of R in datacamp

Field investigation

- Rapid needs assessment at Elliniko refugee camps in June 2016, Athens, Greece.
- Contributed data collection, refugee interview and sampling.

7. EPIET/EUPHEM modules attended

1. Introductory Course, Spetses, Greece 28th September -6th October 2015
2. Joint EPIET/EUPHEM outbreak module, Berlin 7th-11th December 2015
3. Joint EPIET/EUPHEM module on Multivariable Analyses, Vienna 14th-18th March 2016
4. Joint EPIET/EUPHEM RAS module, Athens 20th-26th June 2016
5. Joint EPIET/EUPHEM Project Review Module, Lisbon, 22-26th August 2016
6. EPIET module on Time Series Analyses, Bucharest, 7th-11th November 2016
7. EPIET module on Vaccinology, Stockholm, 12th-16th June 2017
8. EPIET Project Review Module, Lisbon, 28th August-1st September 2017

Supervisor's conclusions

Ying-Shih has spent two productive years as a Taiwanese FETP-fellow (EPIET-associated programme) at AGES. He has worked very hard and shown a great amount of flexibility in adapting to a new professional field as well as a new country. Ying-Shih has supported initiatives of the National Reference centre for influenza epidemiology to improve influenza surveillance in Austria by making quality-indicator based suggestions for changes to the existing surveillance.

Thanks to his background as a medical doctor, and by applying his newly acquired skills of R statistical software, he has made an important contribution to monitor antibiotic consumption in Austria by assessing a new data source. Along the way, he has increased his knowledge and skills in the field of intervention epidemiology. He maintained good relationships with the entire team and contributed to outbreak investigations of *Salmonella* both during the summer of 2016 and 2017.

It has been a pleasure to work with Ying-Shih, even though sometimes challenging. He is hard-working and very keen on acquiring new knowledge and skills. We wish him all the best for the future in whichever field he chooses to work.

Coordinator's conclusions

Ying-shih demonstrated great willingness to learn more about public health and epidemiology to expand on his previous experience in clinical medicine and infection control. He made valuable contributions to training modules, and actively sought learning opportunities. Despite many challenges during his fellowship, he has been diligent in identifying his own learning needs and working together with his EPIET peers to develop his technical skills.

Personal conclusions of fellow

The EPIET training program offers the chance to understand the strategies public health condition in the Europe. I was a medical doctor before and this is an exciting experience to study and work with Cohort 2015. I perceive as this opportunity as a big milestone in my career development. I will strive to use gained skills and knowledge in the best possible way, and I will continue to work on their improvement, in order to attain desired career objectives.

Acknowledgements

It was a great chance for learning and professional development that I can have the opportunity to join this European Programme for Intervention Epidemiology Training based in Austria AGES.. Therefore, I consider myself as a very lucky individual as I was provided with an opportunity to be a part of it. I am also grateful for having a chance to meet so many wonderful people and professionals who led me through this internship period.

I would like to express my deepest gratitude and special thanks to Dr. Daniela Schmid, who in spite of being extraordinarily busy with her duties, took time out to guide and keep me on the correct path and allowed me to carry out my projects at her esteemed organization and extending during the training. She also taught me about the importance of humble and inspires me to learn by myself.

I would also want to acknowledge Lisa Hansen, my EPIET coordinator, for her impressive mentoring and instant response.

I also want to express my deepest thanks to Elisabeth Kanitz for taking part as a supervisor and giving necessary advice and guidance and forming the bridge between me and Dr. Schmid.

I would like to thank Prof. Dr. Franz Allerberger for providing this opportunity to work in AGES. He also provided the research data of the antibiotics consumption.

I am also grateful to all member of AGES infection control department, Alex, Patrick, Lucas and Karin for the valuable information provided by them in their respective fields. I am grateful for their cooperation during the period of my assignment. Thus, the time in AGES very audacious and supportive to my career through which I have gained valuable work experience that will help definitely make a favourable impression on me. Last I would like to acknowledge my EPIET AND EUPHEM peers from my cohort for enriching me in these two years.

References

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