Emmanouil Alexandros (Max) Fotakis

The European Programme for Intervention Epidemiology Training (EPIET), Cohort 2022
Istituto Superiore di Sanità, Italy

Background

The ECDC Fellowship Programme is a two-year competency-based training with two paths: the field epidemiology path (EPIET) and the public health microbiology path (EUPHEM). After the two-year training, EPIET and EUPHEM graduates are considered experts in applying epidemiological or microbiological methods to provide evidence to guide public health interventions for communicable disease prevention and control. The Administrative Decisions ECDC/AD/2023/23 and ECDC/AD/2023/06 govern the EU-track and MS-track, respectively, of the ECDC Fellowship Programme, field epidemiology path (EPIET) and public health microbiology path (EUPHEM).

Both curriculum paths provide training and practical experience using the 'learning by doing' approach at acknowledged training sites across the European Union/European Economic Area (EU/EEA). This final report describes the experiences and competencies the fellow acquired by working on various projects, activities, theoretical fellowship training modules, other modules or trainings, and international assignments or exchanges during the fellowship.

Pre-fellowship short biography

Emmanouil Alexandros (Max) Fotakis obtained a bachelor's degree in Biology and a two-year master's degree in Molecular Biology and Biomedicine from the University of Crete (Greece). In 2017 he was awarded a Hellenic Foundation for Research and Innovation PhD scholarship at the Agricultural University of Athens (Greece), where he investigated several mechanisms conferring insecticide resistance in mosquitoes and sand flies, and piloted integrated vector surveillance programmes in refugee camps in Greece.

After completing his PhD in 2020, Max undertook a master's degree in Public Health Science and Policy at the National School of Public Health of Greece. During this period, he worked in Greece at the Foundation for Research and Technology – Hellas (FORTH) where he developed information technology tools to support vector-borne disease surveillance and control programmes. Throughout his academic journey Max worked in several laboratories and field settings in Greece, Ethiopia, Tanzania, Kenya, Morocco and Türkiye. In September 2022 he moved to Rome to start his EPIET fellowship at Istituto Superiore di Sanità (ISS).

Results

The objectives of the core competency domains were achieved partly through project and activity work and partly by participating in the training modules. Results are presented in accordance with the EPIET/EUPHEM core competencies, as set out in the ECDC Fellowship Manual[1].

[1] European Centre for Disease Prevention and Control (ECDC). European public health training programme. Stockholm: ECDC; 2020. Available from: https://www.ecdc.europa.eu/en/publications-data/ecdc-fellowship-programme-manual-cohort-2021

Stockholm, 2024

1. Epidemiological investigations

1.1. Outbreak investigations

A urokinase-associated outbreak of Ralstonia mannitolilytica *bloodstream infections in haemodialysis patients in north-eastern Italy, January to April 2023 (1,10)*

Supervisors: Patrizio Pezzotti (EPIET supervisor), Lucarelli Claudia (EUPHEM supervisor)

Category: Healthcare-associated infections and antibiotic resistance

Aim: To identify the vehicle(s) and source(s) of a *Ralstonia mannitolilytica* bloodstream infection outbreak in haemodialysis patients in north-eastern Italy.

Methods: A case was defined as any haemodialysis patient with a central vascular catheter (CVC) in the Friuli-Venezia-Giulia region, testing positive for *R. mannitolilytica*, from 21 January 21 2023 onwards. Systematic patient screening was conducted in the affected hospitals. Cultures were performed on blood and CVC tip samples. Environmental and pharmacological samples were retrieved from the hospitals and cultured. Pathogen identification was carried out with MALDI-TOF. Positive clinical and pharmacological samples were subject to whole genome sequencing and phylogenetic analysis. We conducted a retrospective cohort study, including all CVC patients in the affected hospitals receiving treatment between January–April 2023. Key exposures (as in pharmacological solutions) were determined by the microbiological analyses. We calculated attack rates (AR), relative risks (RR), 'dose-response' ARs and RRs, and corresponding 95% confidence intervals (95% CI).

Results: The outbreak involved n=20 patients from four different hospitals. The outbreak source was identified as a batch of urokinase vials imported from India contaminated with *R. mannitolilytica*. Sequences of the clinical and urokinase strains were highly related. Only urokinase-treated patients were reported with *R. mannitolilytica* infections (AR=34%; 95% CI: 22.1–47.4). Discontinuation of the contaminated urokinase terminated the outbreak.

Public health implications: In the context of *R. mannitolilytica* case clusters in haemodialysis units, prime outbreak source suspects should include urokinase solutions. This also applies to other hospital procedure settings using urokinase. Case notification to the MoH allowed for prompt information sharing between local and central health authorities and for nationwide and EU/EEA-wide alerts.

Role: Max was a co-investigator. The fellow attended all meetings with the multidisciplinary outbreak investigation team and contributed to the investigation brainstorming. He contributed towards establishing the final case definition, hypothesis generation, interpreting the analysis outputs and in drawing evidence-driven conclusions. Furthermore, he generated line lists for data acquisition, conducted the descriptive and analytical-epi analyses and plotted the descriptive graphics. Also, together with the ISS EUPHEM fellow, Christina Merakou (Cohort 2021), Max drafted and revised the manuscript which was successfully published in an international, peer-reviewed journal (see section 4.1.), communicating the outbreak, and assisted in the preparation of the outbreak notification message on EPIS. The fellow also prepared a detailed outbreak report.

A trichinellosis outbreak in the Apulia region, Italy, February–March, 2023 (19)

Supervisors: Patrizio Pezzotti, Martina Del Manso, María Ángeles Gómez Morales

Category: Food- and waterborne diseases

Aim: To describe a trichinellosis outbreak reported in the Apulia region and identify potential sources.

Methods: A confirmed case was defined following the ECDC case definition, reporting symptoms from the 1 February 2023 onwards in the broader Lamis area in the Apulia region. Demographic and clinical data, laboratory results and risk factors were collected from symptomatic patients seeking healthcare, using a standard survey form. Serological samples were collected and tested for the presence of anti-*Trichinella* spp. IgG by western blot test.

Results: From 11 February to 20 March 2023, 12 confirmed cases (mean age: 47 years; range: 8–71) were reported. Nine cases were female. All cases presented eosinophilia and myalgia. Other specific signs included diarrhoea (n=7), periorbital edema (n=7), subconjunctival, subungual and/or retinal haemorrhages (n=4) and fever (n=7). All cases reported having eaten pork meat bought at a local butcher's shop, one month prior to symptoms onset. Three cases (25%) consumed cooked unprocessed meat, eight cases (66,7%) consumed processed meat (sausages and hamburgers), and one case (8,3%) dried meat. *Trichinella* spp. was not detected in any environmental samples from the butcher shop.

Public health implications: Pork meat has previously been suggested as a potential source of trichinellosis outbreaks. These findings suggest that local populations do not always follow the hygiene rules specified for the management of animal-origin products for human consumption. Local community education on risks of trichinellosis and the importance of proper handling and cooking of meat may help prevent future outbreaks.

Role: Max was a co-investigator. The fellow attended all meetings with the outbreak team from Foggia and partook in refining the questionnaire and interpreting the investigation findings. He also co-drafted and reviewed the final abstract communicating the outbreak, at the 16th International Conference on Trichinellosis (ICT-16), 2023.

1.2. Surveillance

Human neuroinvasive Toscana *virus infections in Italy from 2016 to 2023 (2,15)*

Supervisors: Flavia Riccardo, Martina Del Manso

Aim: To identify the spatiotemporal distribution and risk groups of neuroinvasive *Toscana* virus (TOSV) infections in Italy from 2016–2023.

Methods: All autochthonous, laboratory-confirmed neuroinvasive TOSV cases notified to the national surveillance system from 2016 to 2023 were retrospectively described using frequencies, proportions, incidences and incidence risk ratios (IRRs) with 95% confidence intervals (CIs), stratified by year, sex, age, Region/Autonomous Province (AP) of infection/exposure and infection/exposure municipality by urbanisation level.

Results: A total of 276 cases were notified in 2022–2023 (average annual incidence: 2.34/1,000,000 persons), compared to 331 cases in 2016–2021 (average annual incidence: 0.92/1,000,000) with increased incidence extending into autumn. In 2022–2023, infections were acquired in 12/21 Regions/APs, the majority in Emilia-Romagna (57.6% (159/276)) similar to 2016–2021, including four Regions/APs with no notified infections in 2016–2021. Like 2016–2021, during 2022–2023, residence in rural municipalities (versus urban), male sex, working age and age >67 years (versus <18 years), were identified as risk factors with IRRs of 2.89 (95% CI=2.01–4.17), 2.17 (95% CI=1.66–2.84), 5.31 (95% CI=2.81–10.0), and 5.06 (95% CI=2.59–-9.86), respectively.

Public health implications: Italy experienced a substantial increase in TOSV transmission in 2022–2023 compared to previous years. Our findings highlight the need of raising public awareness in Italy to prevent sand fly exposure by adopting risk-mitigating behaviours, with a special focus on working age and elderly males, and individuals residing in rural municipalities. In addition, raising awareness among clinicians of the potential expansion of high transmission temporality may further encourage considering TOSV in the differential diagnosis of patients presenting neuroinvasive infection symptomatology, during late summer and autumn.

Role: The fellow designed the study, performed data cleaning and analysis, interpreted the analysis findings and wrote and submitted a manuscript which was accepted for publication in an international, peer-reviewed journal.

Description and comparison of national surveillance systems and response measures for Aedes*-borne diseases in three countries in southern Europe, 2024 (France, Italy and Portugal (3,17,21)*

Supervisors: Flavia Riccardo (Italy), Paula Vasconcelos (Portugal), Lauriane Ramalli (France)

Aim: To describe and compare *Aedes*-borne diseases (dengue, chikungunya and Zika viruses) and vector surveillance systems and response measures in place, across France, Italy, and Portugal.

Methods: A benchmarking analysis was performed to systematically describe and compare the different systems. Data were collected from key-informant interviews, national guidelines and reports, and scientific literature using a standardised questionnaire adapted from the ECDC framework.

Results: All countries have an integrated surveillance system for *Aedes*-borne diseases and share similarities in surveillance type, geographic coverage, and case definitions. Differences mainly pertain to event-based and active surveillance activities. Geographic coverage of vector surveillance is national in France and Portugal, and regional in Italy. In response to autochthonous transmission, all countries implement or foresee active case-finding, blood safety protocols and xenomonitoring, while France and Italy strongly rely on vector control. Upon vector detection in non-colonised areas, all countries implement ad hoc entomological surveillance and vector control.

Public health implications: Surveillance systems and response measures in France, Italy, and Portugal are broadly similar, with some variations reflecting differences in the organisation of national health systems, *Ae. albopictus* distribution and local transmission of *Aedes*-borne diseases. Cross-border collaboration in Europe can enhance best practices in surveillance and response. Risk-based surveillance, considering national and cross-border epidemiological and entomological situations, can strengthen preparedness and early warning for *Aedes*-borne diseases in Europe.

Role: This was a joint project between the fellows, Max Fotakis, Berta Grau-Pujol (Portugal) and David Kelly (France). The fellows conceived the study design and coordinated the cross-border project, designed the survey questionnaire framework, collected the information, drafted the initial manuscript and prepared the final manuscript which was submitted to an international, peer-reviewed journal.

Routine surveillance activities

Epidemic Intelligence from Open Sources – EIOS, 2023–2024 (13)

Supervisors: Flavia Riccardo, Alberto Mateo-Urdiales

Activities and role: Max was involved in the ISS epidemic intelligence team activities. He represented Italy in the Global Health Security Initiative – Early Alerting and Reporting (EAR) Senior Officials meetings held every week online. When Italy was on call (approximately every five weeks for a duration of seven days) he used EIOS on a daily basis to monitor events of public health significance around the globe. In 2023–2024, he produced and presented a total of 10 weekly situation reports sharing information to all participant countries.

2. Applied public health research

Socioeconomic inequalities in SARS-CoV-2 infection and COVID-19 health outcomes in urban Italy during the COVID-19 vaccine rollout, January–November 2021 (4,14,16)

Supervisors: Patrizio Pezzotti, Alberto Mateo-Urdiales, Massimo Fabiani

Aim: To analyse the evolution of the association of socioeconomic deprivation (SED) with SARS-CoV-2 infection and COVID-19 outcomes in urban Italy during the vaccine rollout in 2021.

Methods: A retrospective cohort analysis was conducted between January–November 2021, comprising of 16,044,530 individuals aged ≥20 years, by linking national COVID-19 surveillance system data to the Italian SED index calculated at census block level. Incidence rate ratios (IRRs) of infection and severe COVID-19 outcomes were estimated by SED tercile relative to the least deprived tercile, over three periods defined as low (0–10%); intermediate (>10–60%); and high (>60–74%) vaccination coverage.

Results: We found patterns of increasing relative socioeconomic inequalities in infection, hospitalisation and death as COVID-19 vaccination coverage increased. Between the low and high coverage periods, IRRs for the most deprived areas increased from 1.09 (95% CI 1.03–1.15) to 1.28 (95% CI 1.21–1.37) for infection; 1.48 (95% CI 1.36–1.61) to 2.02 (95% CI 1.82–2.25) for hospitalisation; and 1.57 (95% CI 1.36–1.80) to 1.89 (95% CI 1.53–2.34) for death.

Public health implications: Deprived populations in urban Italy should be considered vulnerable groups in future pandemic preparedness plans for COVID-19, particularly, during mass vaccination roll out phases with gradual lifting of social distancing measures.

Role: The fellow designed the study, drafted the study protocol, performed data cleaning, carried out the analysis, and drafted and submitted the manuscript which was published in an international, peer-reviewed journal (see section 4.1).

Impact of the 2023/24 autumn to winter COVID-19 seasonal booster campaign in preventing severe cases of COVID-19 in Italy (October 2023–March 2024) (5,18)

Supervisors: Patrizio Pezzotti, Alberto Mateo-Urdiales, Massimo Fabiani

Aim: To assess the impact of the 2023/24 vaccination campaign on the number of severe cases of COVID-19 (i.e. hospitalisations or deaths) averted in Italy.

Methods: A retrospective cohort analysis was conducted between October 2023–March 2024 in 15,558,829 persons aged 60 years and above (with at least one previous booster dose), eligible to receive the seasonal booster at the start of the campaign. Linking data from the Italian surveillance system to national vaccination registry data, adjusted relative vaccine effectiveness (rVE) of the seasonal booster was estimated against severe COVID-19 using Cox regression. The number of severe cases averted were estimated as (N*VC*rVE)/[1-(VC*rVE)] (N: number of observed events; VC: vaccination coverage), also evaluating hypothetical VC scenarios.

Results: The majority of severe events occurred in December (n=10,027; 37%). During the study period, VC reached 10.7%. Booster rVE decreased from 60% (95% CI:51–67) in October–November to 36.0% (95% CI:21–47) in February–March 2024. It was estimated that 565 (95% CI: 497–625) cases were averted, corresponding to 2.1% of the expected cases without a vaccination campaign. Three vaccination coverage scenarios were simulated: 50%, 75%, 90%, finding that 9.7%, 14.5% and 17.4% of the expected cases would have been averted, respectively.

Public health implications: The study found that the 2023/24 COVID-19 autumn to winter campaign averted a low number of severe COVID-19 cases, mainly due to the low uptake of the booster dose in the eligible population. These findings can be used by public health authorities to aid decision-making and planning of future COVID-19 vaccination campaigns.

Role: The fellow co-designed the study, carried out the analysis, and reviewed and submitted a manuscript to an international, peer-reviewed journal.

3. Teaching and pedagogy

Outbreak investigation case study for students in the master's degree in public health programme of the University of West Attica, Greece, 2023

This activity involved adapting and translating to Greek a case study by the United States Centers for Disease Control and Prevention (US CDC) 'Gastroenteritis at a University in Texas' (facilitator and participant version). The fellow delivered the case study (three hours) on 11 May 2023, online, to students in the master's degree in public health programme of the University of West Attica, specialisation in Health Promotion of Children and Adolescents – School Health. Fourteen students attended the class. An anonymised evaluation questionnaire was sent out via EU survey, with closed and open-ended questions. The participants rated the case study class content and delivery as excellent.

Outbreak investigation case study for EPIET introductory course, 2024

The fellow developed a case study based on a real *Ralstonia mannitolilytica* bloodstream infection outbreak in haemodialysis patients in Italy, for the purposes of the EPIET introductory course. Parts of the case study were fictionalised, however, the main content reflected the actual outbreak, its challenges and lessons learnt. This case study bridged epidemiological and microbiological investigation practices aiming: (i) to strengthen the understanding of what epidemiological and microbiological investigations bring to the table and how they complement each other; (ii) to enhance future EPIET-EUPHEM collaborations driven by fellows in the context of outbreak investigations.

Early Warning, Alert and Response (EWAR) in emergencies; training material, 2023

This activity involved developing a power-point presentation (40 slides) for Istituto Superiore di Sanità (ISS) on indicator-based surveillance for EWAR, and integrating relevant content in a case study (participant and facilitator version) on EWAR in emergency settings. The target audience was public health professionals from EU/EEA countries.

4. Communications related to the EPIET/EUPHEM fellowship

4.1. Manuscripts published in peer-reviewed journals

1. Fabricci M, Trinca A, Talotti L, Busetti M, **Fotakis EA**, Merakou C, et al. A urokinase-associated outbreak of *Ralstonia mannitolilytica* bloodstream infections in haemodialysis patients in north-eastern Italy, January to April 2023. Euro Surveill. 2023;28(28):2300328. doi:10.2807/1560-7917.ES.2023.28.28.2300328

2. **Fotakis EA**, Di Maggio E, Del Manso M, Mateo-Urdiales A, Petrone D, Perego G, et al. Human neuroinvasive Toscana virus infections in Italy from 2016 to 2023: Increased incidence in 2022-2023. Submitted to *Eurosurveillance* (2024); Accepted.

3. **Fotakis EA***, Grau-Pujol B*, Kelly D*, Charles T, Vasconcelos P, Pinto Leite P, et al. A multi-country description and comparison of national surveillance systems and response measures for Aedes-borne diseases in three countries in Southern Europe (France, Italy and Portugal). Submitted to *Eurosurveillance* (2024); under review;*equal contribution.

4. **Fotakis EA**, Mateo-Urdiales A, Fabiani M, Sacco C, Petrone D, Riccardo F, et al. Socioeconomic Inequalities in SARS-CoV-2 Infection and COVID-19 Health Outcomes in Urban Italy During the COVID-19 Vaccine Rollout, January-November 2021. J Urban Health. 2024;101(2):289-299. doi:10.1007/s11524-024-00844-0

5. **Fotakis EA***, Picasso E*, Sacco C, Petrone D, Del Manso M, Bella A, et al. Impact of the 2023/24 autumn-winter COVID-19 seasonal booster campaign in preventing severe COVID-19 cases in Italy (October 2023 - March 2024). Vaccine. 2024 Sep 18;42(26):126375. doi: 10.1016/j.vaccine.2024.126375. Epub ahead of print. PMID: 39298999.

6. Mateo-Urdiales A, Sacco C, **Fotakis EA**, Del Manso M, Bella A, Riccardo F, et al. Relative effectiveness of monovalent and bivalent mRNA boosters in preventing severe COVID-19 due to omicron BA.5 infection up to 4 months post-administration in people aged 60 years or older in Italy: a retrospective matched cohort study. Lancet Infect Dis. 2023;23(12):1349-1359. doi:10.1016/S1473-3099(23)00374-2

7. Fabiani M, Mateo-Urdiales A, Sacco C, **Fotakis EA**, Rota MC, Petrone D, et al. Protection against severe COVID-19 after second booster dose of adapted bivalent (original/Omicron BA.4-5) mRNA vaccine in persons ≥60 years, by time since infection, Italy, 12 September to 11 December 2022. Euro Surveill. 2023;28(8):2300105. doi:10.2807/1560-7917.ES.2023.28.8.2300105

8. Fabiani M, Mateo-Urdiales A, Sacco C, Rota MC, **Fotakis EA**, Petrone D, et al. Relative effectiveness of bivalent Original/Omicron BA.4-5 mRNA vaccine in preventing severe COVID-19 in persons 60 years and above during SARS-CoV-2 Omicron XBB.1.5 and other XBB sublineages circulation, Italy, April to June 2023. Euro Surveill. 2023;28(32):2300397. doi:10.2807/1560-7917.ES.2023.28.32.2300397

9. Fabiani M, Mateo-Urdiales A, Sacco C, **Fotakis EA**, Battilomo S, Petrone D, et al. Effectiveness against severe COVID-19 of a seasonal booster dose of bivalent (original/Omicron BA.4-5) mRNA vaccines in persons aged ≥60 years: Estimates over calendar time and by time since administration during prevalent circulation of different Omicron subvariants, Italy, 2022–2023. Vaccine. Published online June 3, 2024. doi:10.1016/j.vaccine.2024.05.074

4.2 Other reports

10. **Fotakis EA**. Outbreak of *Ralstonia mannitolilytica* bloodstream infections in haemodialysis patients in north-eastern Italy, 2023. Internal report.

11. **Fotakis EA**, Mateo-Urdiales A. Healthy Sailing – Surveillance Alert thresholds, 2022. Internal report.

12. **Fotakis EA**, Mateo-Urdiales A, Del Manso M. COVID-19 surveillance system transition, 2022. Internal report.

13. **Fotakis EA**. Global Health Security Initiative – Early Alerting and Reporting (EAR) Senior Officials Report. Ten weekly reports (2023–2024) circulated to partner countries.

4.3 Conference presentations

14. **Fotakis EA**, Mateo-Urdiales Alberto, Fabiani M, Riccardo F, Pezzotti P. Importance of socioeconomic status for COVID-19 outcomes in urban Italy during the vaccine rollout, January–November 2021 (poster). Presented at: ESCAIDE; 22 November 2023; Barcelona, Spain.

15. **Fotakis EA**, Di Maggio E, Mateo-Urdiales A, Del Manso M, Perego G, Petrone D, et al. Elevated neuroinvasive Toscana Virus incidence in Italy during 2022: an emerging public health threat? (poster). Presented at: ESCAIDE; 23 November 2023; Barcelona, Spain.

16. **Fotakis EA**, Mateo-Urdiales Alberto, Fabiani M, Sacco C, Pezzotti P. Socioeconomic inequalities in SARS-CoV-2 infection and COVID-19 health outcomes in urban Italy during the COVID-19 vaccine rollout, January–November 2021 (oral). Presented at: Congresso AIE XLVIII; 19 April 2024; Riccione, Italy.

17. **Fotakis EA***, Grau-Pujol B*, Kelly D*, Charles T, Vasconcelos P, Pinto Leite P, et al. A multi-country description and comparison of national surveillance systems and response measures for Aedes-borne diseases in three countries in Southern Europe (France, Italy and Portugal) (oral). To be presented at: 17th European Public Health Conference; 12–15 November 2024; Lisbon, Portugal.

18. **Fotakis EA**, Picasso E, Sacco C, Petrone D, Del Manso M, Bella A, et al. Low impact of the autumn-winter COVID-19 seasonal booster campaign in averting severe COVID-19 cases in Italy (October 2023 - March 2024) (poster). To be presented at: ESCAIDE; 20–22 November 2024, Stockholm, Sweden.

19. Elisa Di Maggio, et al. Investigation of a trichinellosis Outbreak in Apulia region, Italy, February-March 2023 (poster). XVI International Conference on Trichinellosis (ICT-16), 30 August–1 September 2023; Belgrade, Serbia.

4.4 Other presentations

20. **Fotakis EA**. Surveillance and outbreak investigation – Perspectives from Italy (oral). Presented at: Epidemic Intelligence at ECDC: processes and data analytics; 26 October 2023; Stockholm, Sweden.

21. **Fotakis EA***, Grau-Pujol B*, Kelly D*, Charles T, Vasconcelos P, Pinto Leite P, et al. A multi-country description and comparison of national surveillance systems and response measures for *Aedes*-borne diseases in three countries in southern Europe (France, Italy and Portugal), 2024 (oral). Presented at: ECDC expert workshop for the development of a public health guidance to support the assessment of the risk of locally-acquired *Aedes*-borne viral diseases in the EU/EEA; 16 April 2024, virtual.

5. EPIET/EUPHEM modules attended

- Introductory Course, 26 September–14 October 2022, Spetses, Greece
- Outbreak Investigation, 5–9 December 2022, Berlin, Germany
- European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE) 2022, 23–25 November 2022, Stockholm, Sweden
- Qualitative Research – Optional Inject Days, 31 January and 3 February 2023, virtual

- Multivariable Analysis, 22–26 May 2023, Frankfurt, Germany
- Rapid Assessment and Survey Methods, 19–23 June 2023, Stockholm, Sweden
- Project Review Module 2023, 28 August–1 September 2023, Lisbon, Portugal
- European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE) 2023, 22–24 November 2023, Barcelona, Spain
- Time Series Analysis, 11–15 December 2023, Rome, Italy
- Vaccinology, 4–8 March 2024, virtual
- Writing Abstracts for Scientific Conferences, 20 March 2024, virtual
- Management, Leadership and Communication in Public Health, 24–28 June 2024, Stockholm, Sweden
- Project Review Module 2024, 26–30 August 2024, Lisbon, Portugal
- European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE) 2024, 20–22 November 2024, Stockholm, Sweden

6. Other training

- Applied Epi R intro course, 28 November–1 December 2022, virtual
- WHO training on EIOS (Epidemic Intelligence from Open Sources), 5–9 June 2023, Rome
- ECDC training on Epidemic Intelligence, 23–27 October 2023, Stockholm
- ECDC Epidemic Intelligence Network Meeting, 28–29 May 2024, Rome
- ECDC Workshop on Strengthening Preparedness and Response to West Nile virus infections, 22–24 March 2023, Rome
- Universität Bielefeld, School of Public Health – Seminar Series Part II: Public Health and War, 19 October–30 November 2022, virtual
- RKI- Infectious disease epidemiology course, 27 October–23 February 2023, virtual
- EAN webinar: Xenomonitoring and surveillance: Using mosquitoes to find (and control) pathogens, by Corrado Minetti, 26 October 2022, virtual

7. Other activities

Epidemic Intelligence

Supervisors: Flavia Riccardo, Alberto Mateo-Urdiales

Max was involved in the ISS epidemic intelligence team activities. As a member of the team, he participated in the WHO EIOS training held in Italy (June 2023), and the ECDC training on epidemic intelligence held in Stockholm (October 2023). He also attended the ECDC Epidemic Intelligence Network Meeting, held in Rome (May 2024).

Estimating vaccine effectiveness of COVID-19 mRNA vaccines in persons ≥ 60 years, Italy, 2022–2023 (6,7,8,9)

Supervisors: Patrizio Pezzotti, Alberto Mateo-Urdiales, Massimo Fabiani

Max was involved in several studies estimating the relative effectiveness of COVID-19 vaccine booster doses with monovalent or bivalent mRNA vaccines against severe COVID-19 in Italy, with a main focus on people aged 60 years and above. He participated in meetings conceptualising the studies and the different study designs, reviewed the current epidemiological, immunological, and microbiological literature, and contributed to the writing of several manuscripts, which were accepted for publication in peer-reviewed journals.

Acknowledgements

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