

Gonçalo Matias

The European Programme for Intervention Epidemiology Training (EPIET), Cohort 2022
National Institute for Public Health and Environment (RIVM), Netherlands

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

Gonçalo Matias is a veterinarian and an epidemiologist with more than 15 years of experience in public health, specialising in vaccine research. His career began at the Institut Pasteur in Paris, where he worked as a researcher focusing on neglected diseases in Africa. He also taught epidemiology at the university level. He later transitioned to the vaccine industry, where he was involved in the development of the H1N1 pandemic influenza vaccine and the quadrivalent influenza vaccine (QIV). Gonçalo has led and implemented research projects across Africa, Asia, South America, Europe, and the USA, using various epidemiological methods, such as virological surveillance, modelling disease burden, and vaccine effectiveness studies. Before the EPIET fellowship, he focused on vaccine benefit-risk analysis using multicriteria decision methods.

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 Manual¹.

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>

1. Epidemiological investigations

1.1. Outbreak investigations

*Outbreak of toxigenic *Corynebacterium diphtheriae* among asylum seekers attending reception centres in the Netherlands, 2023*

Supervisors Dimphey van Meijeren, Susan Hahné, Hester de Melker, Daan Notermans

Category: Vaccine-preventable diseases

Aim: To estimate the prevalence of diphtheria among asylum seekers with wounds attending reception centers in the Netherlands, in 2023.

Methods: A cross-sectional survey was conducted. Refugees aged 16 years or older, arriving at one of the two national first-registration centers and consulting a general practitioner (GP) for wounds between 5 June and 30 July 2023, were invited to participate. Swabs were taken from the most suspicious wounds and the throat. Diagnostics involved culturing, combined with PCR on the first-day culture and on *Corynebacterium diphtheriae* isolates. Positive isolates were sequenced. The prevalence of toxin gene-bearing *Corynebacterium diphtheriae* was estimated with 95% confidence intervals using Fisher's exact test.

Results: Among 61 participants, most were male (95%) and from Syria (68%), aged 16–54 years (median age 23). Both wound and throat swabs were taken from 45 participants, only a wound swab from 15, and only a throat swab from one. Toxin gene-bearing *C. diphtheriae* was found in six of 60 wounds (10%, 95% CI: 3.8%–20.5%), with throat carriage in three cases. Sequence type (ST)377 was found in four cases from Syria. Two cases from Eritrea were genetically identical with a non-defined ST.

Public health implications: The study informed national policies, emphasising collaboration between health authorities and refugee services to manage outbreaks. Targeted interventions, including vaccination strategies, screening protocols, prophylactic antibiotics, and improved vaccination coverage in countries of origin, are recommended for high-risk groups.

Role: Gonçalo Matias was a co-investigator for the outbreak, where he designed the database, provided scripts in R for the statistical analysis, and wrote a manuscript for submission to a peer-reviewed journal.

1.2 Surveillance

Surveillance of neonatal herpes simplex virus (nHSV) infection in the Netherlands from 2016 to 2022

Supervisors: Eline Op de Coul, Susan Hahné

Aim: To estimate the incidence of neonatal herpes simplex virus (nHSV) infections, assess health outcomes, and evaluate adherence to guidelines in the Netherlands between 2016–2022.

Methods: A retrospective, cross-sectional survey was conducted across pediatric, obstetric, and microbiology departments in hospitals. Online questionnaires collected data on nHSV cases, diagnostics, health outcomes, and self-reported adherence to guidelines. Incidences were calculated per 100,000 live births and compared with data from Dutch Hospital Data (DHD) for the same period. The survey was distributed through professional associations to ensure broad participation.

Results: The survey had a response rate of 30% from pediatric, 19% from obstetric, and 65% from microbiology departments. A total of 66 cases was reported, with an incidence rate of 5.5/100,000 live births, slightly lower than the DHD data, which indicated 72 cases and an incidence of 6.0/100,000. Out of 51 cases with known outcomes, 67% had severe symptoms, and the case fatality rate was 6.7%. Adherence to national guidelines was high, with most departments following recommended practices for diagnostics and treatment.

Public health implications: The study highlights that the incidence of nHSV in the Netherlands is at least as high as in previous years and emphasises the need to address severe cases. Mortality has decreased, underscoring the importance of early diagnosis and timely treatment. The findings also support the need for systematic surveillance and recommend considering making nHSV a notifiable disease to improve monitoring and strengthen public health responses.

Role: Gonçalo Matias was involved in database management and data cleaning, performed the statistical analysis, and wrote the report. He also wrote an abstract and prepared a poster for presentation at the European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE) 2024.

2. Applied public health research

Effect of bivalent COVID-19 vaccination and prior infection on risk of asymptomatic and symptomatic SARS-CoV-2 Omicron infection – a prospective cohort study in the Netherlands

Supervisors: Anne Huiberts, Mirjam Knol, Susan Hahné

Aim: To assess the long-term effectiveness of bivalent COVID-19 vaccines against symptomatic and asymptomatic SARS-CoV-2 Omicron infections, thereby assessing the effect of severity of prior infections.

Methods: The VASCO study is a prospective cohort study among Dutch adults. The primary endpoint was self-reported positive SARS-CoV-2 tests between 26 September 2022 and 26 September 2023. Prior infections were identified through serology and self-reported positive tests. Participants at baseline had received the primary COVID-19 vaccination series and one or two monovalent boosters. Cox proportional hazards models were used to assess vaccine effectiveness (VE) of bivalent vaccination as a time-varying exposure, adjusted for age, sex, education, and medical risk.

Results: The study included 34,212 participants with a median age of 59.4 years. Vaccine effectiveness (VE) of the bivalent vaccine against Omicron infection was 12% for ages 18–59 and 6% for ages 60–85. VE was highest in the first six weeks post-vaccination but diminished significantly after 12 weeks. Prior infection provided more significant protection against re-infection than bivalent vaccination alone, with 46% protection from pre-Omicron infections and up to 94% protection from Omicron BQ1/XBB infections. Moderate-severity infections conferred 73% protection, while asymptomatic infections provided 61% protection in the 18–59 age group.

Public health implications: The study demonstrates that bivalent vaccines offer short-term protection, but prior infection, especially Omicron, provides stronger and longer-lasting immunity. These findings underscore the importance of considering prior infection status in vaccination strategies and the need for ongoing surveillance to monitor vaccine effectiveness over time.

Role: Gonçalo Matias developed the protocol, performed the statistical analysis, and wrote the final manuscript. He also wrote an abstract and prepared a poster for ESCAIDE 2023.

3. Teaching and pedagogy

Teaching Outbreak Investigations at Radboud University Medical Center, the Netherlands, 2022 and 2023

Gonçalo delivered two four-hour sessions on outbreak investigations at Radboud University Medical Center in December 2022 and December 2023. He utilised the case study, 'An Outbreak of Gastroenteritis in Kalundborg, Denmark' case study. The sessions included interactive lectures, case analysis, role-playing, and quizzes. The lessons focused on outbreak investigation steps, data interpretation, hypothesis generation, and communication of findings.

Teaching Epicurves at the Netherlands School of Public and Occupational Health, 2024

Gonçalo co-developed and delivered a 1.5-hour lecture at the Netherlands School of Public and Occupational Health (NSPOH) in Utrecht to public health physicians in training, focusing on epicurves. Participants appreciated both the content of the lecture and the group work on building epicurves, which enhanced their practical understanding of outbreak investigations.

4. Communications related to the EPIET/EUPHEM fellowship

4.1. Manuscripts published in peer-reviewed journals

Matias G, Huiberts A, de Gier B, de Melker H, van den Hof S, Hahné S, Knol M. Effect of bivalent COVID-19 vaccination and prior infection on risk of asymptomatic and symptomatic SARS-CoV-2 Omicron infection: a prospective cohort study in the Netherlands. *Epidemiol Infect.*

Matias G, van Meijeren D, Mariman R, Ruijs H, van Veldhuizen J, Tolsma P, Goverse I, de Graaf M, Hahné S, de Melker H, Lanzl M, van den Beld M, Notermans D. Prevalence of Toxigenic *Corynebacterium diphtheriae* in Wounds of Refugees Arriving in the Netherlands June-July 2023. *Journal to be determined*. [Submission planned in January 2025].

Matias G, Willemstein I, Vossen A, Bekker V, van Leeuwen L, Keuning M, Kornelisse R, Op de Coul E. Neonatal herpes simplex virus infections in the Netherlands in 2016-2022: incidence, health outcomes and guideline adherence. *Journal to be determined*. [Submission planned in January 2025].

4.2. Other reports

Matias G, Willemstein I, Bekker V, Kornelisse R, Keuning M, van Leeuwen L, Vossen A, Op de Coul E. Neonatal herpes simplex virus infections in the Netherlands (2016–2022): incidence, health outcomes, and guideline adherence. Bilthoven: RIVM; 2024. Available at: [URL pending].

4.3. Conference presentations

Matias G, Willemstein I, Bekker V, Kornelisse R, Keuning M, van Leeuwen L, Vossen A, Op de Coul E. Neonatal herpes simplex virus infections in the Netherlands (2016-2022): incidence, health outcomes, and guideline adherence (poster). Presented at: The European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE); 20–22 November 2024; Stockholm, Sweden.

Matias G, Huiberts A, de Gier B, de Melker H, van den Hof S, Hahné S, Knol M. Protection conferred by prior SARS-CoV-2 infection with or without bivalent mRNA booster vaccination against symptomatic Omicron SARS-CoV-2 infection in a Dutch prospective cohort study (VASCO) (online poster). Presented at: The European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE); 22–24 November 2023; Barcelona, Spain.

4.4. Other presentations

Matias G, Huiberts A, de Gier B, de Melker H, van den Hof S, Hahné S, Knol M. Long-term effectiveness of bivalent COVID-19 vaccines against symptomatic and asymptomatic SARS-CoV-2 Omicron infections, assessing the effect of severity of prior infections (oral presentation). Presented at: Rijksvaccinatieprogramma (RVP), RIVM; January 2024; Bilthoven, Netherlands.

Meijeren D, Ruijs H, Mariman R, Tolsma P, Goverse I, de Graaf M, **Matias G**, Hahné S, de Melker H, Lanzl M, van den Beld M, Notermans D. High prevalence of toxigenic *Corynebacterium diphtheriae* in wounds of refugees arriving in the Netherlands in June and July 2023 (oral presentation). Presented at: The European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE); 22–24 November 2023; Barcelona, Spain.

Presentation on career path; December 2023; Radboud UMC, Nijmegen.

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, 14 March or 20 March 2024, virtual
- Qualitative Research – Elective course, 19 and 22 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

- Molecular Epidemiology Mini-Module, 20–21 November 2023, Barcelona, Spain

7. International assignments

- Reinforcement of Epidemic Intelligence for the World Youth Day (JMJ), 17 July–12 August 2023, Lisbon, Portugal
- Gonçalo participated in a four-week deployment to support the Direção Geral da Saúde (DGS) and the Coordination of the Public Health Emergencies Operations Centre (CESP) in Lisbon during the World Youth Day 2023. The assignment involved integrating into the Epidemic Intelligence (EI) team at the Public Health Emergencies Operation Centre (PHEOC) to reinforce real-time monitoring, event-based surveillance, and syndromic vigilance. Contributions included daily epidemic intelligence reports, data analysis, and the development of R scripts for real-time health risk monitoring. Additionally, Gonçalo took part in meetings addressing public health responses, such as managing an environmental detection of *Legionella*.

8. Other activities

Gonçalo regularly participated in the weekly scientific seminars organised by the Epidemiology and Surveillance Department at the RIVM. He also attended the weekly RIVM early warning meetings and visited the SALTRO laboratory in Utrecht as part of the outbreak investigation project. In addition, Gonçalo attended the COVID-19 Methods online meeting organised by the WHO and developed a risk assessment for diphtheria vaccination in immigrants older than 18 Years, delivered as a slide presentation in 2023.

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