Joana Sequeira Neto

The European Programme for Intervention Epidemiology Training (EPIET), Cohort 2023

Finnish Institute for Health and Welfare (THL), Finland

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/2022/16 Rev.01 and ECDC/AD/2023/06 govern the European Union (EU)-track and Member State (MS)-track, respectively, of the ECDC Fellowship Programme, field epidemiology path (EPIET) and public health microbiology path (EUPHEM), Cohort 2023.

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

Joana Rita Sequeira Neto graduated as a medical doctor in 2016 from the University of Beira Interior, Portugal. Since 2018, she has worked at the Alentejo Litoral Public Health Unit of the Alentejo Region Health Administration, initially as a resident of the Public Health Medical Specialisation, and since 2023, as a Public Health specialist. During her six years in public health practice, she has gained experience in infectious diseases and non-communicable disease surveillance, immigrant health and mental health programmes, community intervention projects, health quality management and auditing. She served as a travel medicine expert at the International Vaccination Centre in the Alentejo Region for four years, providing specialised travel medicine consultations. Joana holds a post-graduate degree in Project Management in Health and is certified by the International Project Management Association.

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). Manual for the ECDC Fellowship Programme EPIET and EUPHEM paths. Stockholm: ECDC; 2025. Available at: https://www.ecdc.europa.eu/en/publications-data/ecdc-fellowship-programme-manual

Stockholm, 2025

1. Epidemiological investigations

1.1. Outbreak investigations

1.1.1. Outbreak of pneumococcal pneumonia in Turku, Finland, 2023

Supervisors: Lotta Siira (THL), Timothée Dub (THL)

Category: Vaccine-preventable diseases

Aim: To identify risk factors associated with shipyard settings to inform targeted control measures and recommendations for prevention of future outbreaks.

Methods: On 29 August 2023, THL was notified by the well-being services county of Southwest Finland (Varha), of a potential cluster of pneumococcal pneumonia among employees from a shipyard in Turku, Western Finland. A case–control study was conducted. Shipyard workers employed at least since 1 August 2023 were included in the analysis. We recruited controls in person using a convenience sampling strategy during a field visit to the shipyard on 16 November 2023. All identified cases were invited for an interview over telephone. For risk factors of interest, odds ratios (OR) and 95% confidence intervals (95% CI) were calculated. Blood culture isolates were serotyped and whole genome sequenced (WGS) at THL. Cluster analysis was done using multilocus sequence typing (MLST) and core genome MLST (cgMLST).

Results: Fourteen cases were identified between 19 August 2023 and 15 October 2023. Eleven cases and 67 controls were included in the study. Compared to the controls, cases were more likely to be living in an apartment/studio (OR: 10.3, 95% CI: 1.3–458.94) or in a hotel/hostel (OR: Inf, 95% CI: 1.2–Inf). Cases were less likely to be living in houses (OR: 0.00, 95% CI: 0.00–0.46), living with family (OR: 0.15, 95% CI: 0.02–0.82), or to be working longer than one year at the shipyard (OR: 0.1, 95% CI: 0.0–0.7).

Two serotypes (4, 9V) representing three sequence types were identified: ST801 (serotype 4, n=5), ST2025 (9V, n=1), and ST239 (9V, n=1). cgMLST revealed three distinct clusters, differing by over 900 alleles.

Public health implications/Conclusions: This was the second reported pneumococcal outbreak occurring in this shipyard within five years (the last one was in 2019). Microbiological typing confirmed a multi-strain outbreak, suggesting that shipyard conditions as well as living conditions could be facilitating transmission and progression from carriage to severe disease. Longer tenure at the shipyard may imply prior vaccination post-2019 outbreak or earlier colonisation, potentially resulting in higher protective immunity. All employees working on ship construction and exposed to fumes, dusts, or smoke merit vaccination against pneumococcal disease.

Role: Joana joined the outbreak investigation team in October 2023 as co-investigator supporting the lead investigator, Wioleta Kitowska (EPIET 2022). She participated in various activities related to the case–control study, which included the following field activities: contributed to the development and translation of the questionnaire and other required materials; helped to plan the shipyard field visit to recruit controls; performed selection and recruitment of controls on site; contributed to drawing conclusions from the outbreak investigation and formulating public health recommendations; worked as co-author on a scientific manuscript (see, '4.1. Manuscripts published in peer-reviewed journals') and a scientific communication (see, '4.3. Conference presentations').

1.1.2. Outbreak of hepatitis E related to salami processed meat (meetvursti), Finland, January–September 2024

Supervisor: Ruska Rimhanen-Finne (THL)

Category: Food- and waterborne diseases

Aim: To investigate the source and extent of the outbreak to guide the implementation of control measures.

Methods: We applied an initial trawling questionnaire and performed analysis of consumer food purchase data. According to the results, we conducted a sequence of two case–control studies: CC1 in March and CC2 in June 2024). Subsequently, we combined both in a final case–control study (CC1–CC2). Cases were individuals who had hepatitis E virus (HEV) infection confirmed with positive detection of anti-HEV immunoglobulin M (IgM), reported to the Finnish National Infectious Diseases Register (NIDR) from 1 January 2024 to 30 September 2024. Controls were identified from a national pool of random controls. Participants were recruited by post-letter and completed an online questionnaire about their consumption of salami products from different brands and manufacturers. For exposures to salami products and pooled origin manufacturers (Manu A–F), adjusted odds ratios (aOR) for age and sex, 95% confidence intervals (95% CI) and p-values were calculated. A food trace-back investigation was also conducted. HEV isolates and selected food items were screened for HEV and genotyped at the THL.

Results: Results are confidential and not officially communicated yet.

Public health implications/Conclusions: Salami products from producer X were the most likely vehicle of this outbreak. Although uncommon in Finland, HEV should be considered a cause of food-borne outbreaks, especially in those that might be related to pork meat consumption. The collaboration among different national authorities proved to be of great value during this investigation.

Role: Joana joined the outbreak investigation in late January 2024, supporting the senior lead investigator, Ruska Rimhanen-Finne. She collaborated in purchase data analysis, created and updated daily epidemic curves, gave feedback on the first case–control questionnaire, and participated in THL outbreak investigation meetings providing technical and methodological support. She conducted data analysis for the three case–control studies using R, specifically database management and cleaning, development of the analysis plan, writing of R scripts, and performing both descriptive and analytical analyses. Joana presented the preliminary investigation and case–control results at internal outbreak team meetings, EPIET/EUPHEM meetings, and THL outbreak meetings (see, '4.4. Other presentations'). She also wrote the confidential outbreak report (see, '4.2. Other reports') and drafted an abstract to the European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE) 2024 which remained unsubmitted due to outbreak investigation constraints.

1.1.3. Outbreak of pneumococcal pneumonia in Turku, Finland, 2025

Supervisor: Lotta Siira (THL)

Category: Vaccine-preventable diseases

Aim: To identify risk factors associated with shipyard settings to inform targeted control measures and recommendations for prevention of future outbreaks.

Methods: We conducted a case–control study in the shipyard during the vaccination campaign. Controls were shipyard workers recruited at the vaccination site and one canteen, on a voluntary basis. No further selection criteria were applied for recruitment, and we did not set a predetermined number of controls to minimise the risk of missing data. Self-administered online or paper questionnaires were available in Finnish, English, Russian and Polish with supporting staff available on site speaking nine different languages. We described key characteristics of cases and controls and performed univariable and multivariable analyses to identify risk factors by calculating crude odds ratios (cORs) and adjusted ORs (aORs). Demographic variables and variables with $p < 0.10$ in univariable analysis were entered into the multivariable logistic regression model. Values of $p < 0.05$ were considered significant.

Results: During this outbreak (30 April–6 June 2025), 13 cases were reported, with six confirmed. Thirteen cases and 192 controls were included in the study. Cases and controls were comparable according to most questionnaire variables. However, Finnish nationals were significantly more common among controls, and plumbing tasks were significantly more frequent among cases. Based on univariable analysis, working as a plumber, welding at least 1–2 hours every day, working on machinery and technical decks in the dry dock, and socialising with colleagues outside working hours 2–4 times per month were significantly associated with being a case. Living with other persons was negatively associated with being a case. In multivariable analysis, only performing welding tasks was significantly associated with being a case.

All five isolates from blood culture-positive cases were serotype 4 – sequence type (ST)801. These were nearly indistinguishable from three isolates from the 2019 outbreak, nine Finnish IPD surveillance isolates, and isolates of a 2019 Norwegian shipyard outbreak.

Public health implications/Conclusions: Our findings confirm a persistent undetected circulation of pneumococcal serotype 4 – ST801 in the shipyard, where it repeatedly causes outbreaks. Our study also suggests a broader presence in the community in Finland. Recurrent pneumococcal outbreaks in shipyards underscore the need to implement public health measures, especially routine immunisation, among those at occupational risk of severe pneumococcal disease.

Role: Joana joined the investigation team since the beginning of the outbreak in May 2025. She contributed to formulating the objectives of the outbreak investigation and discussing its methods. She participated in the meetings of the outbreak investigation team with stakeholders and various activities related to the case–control study, which included the following field activities: contributing to the development and translation of the questionnaire and other required materials; helping to plan the shipyard field visit to recruit controls; performing selection and recruitment of controls on site; contributing to drawing conclusions from the outbreak investigation and formulating public health recommendations; co-authoring a scientific manuscript (see, '4.1. Manuscripts published in peer-reviewed journals').

1.2. Surveillance

1.2.1. Underestimation of paediatric invasive group A streptococcal (iGAS) cases in the Finnish surveillance system and comparison with hospital discharge registry, Finland, 2014–2023

Supervisor: Emmi Sarvikivi (THL)

Type of project: Evaluating a surveillance system

Aim: To identify paediatric clinical invasive group A streptococcus (iGAS) cases in the Hospital Discharge Registry (HDR) to assess the completeness of the current iGAS surveillance system in Finland.

Methods: We conducted a population registry-based study, including laboratory-confirmed iGAS cases from the Finnish NIDR and clinical iGAS cases from the HDR, for individuals aged 0–17 years and cases reported from 1 January 2014 to 31 December 2023. To identify iGAS cases in the HDR, we selected 11 ICD-10 codes (the tenth revision of the International Classification of Diseases) according to the literature, including A40.0 (GAS sepsis) and B95.0 (disease due to GAS). We used unique personal identifiers to assess the overlap of iGAS cases in both registries.

Results: We identified 138 paediatric iGAS cases in the NIDR and 135 cases in the HDR. Of the HDR cases, 88 (65%) overlapped with the NIDR cases. Of the 47 cases found only in HDR, 37 (79%) were coded as GAS sepsis, and 10 as other iGAS clinical presentations: pneumonia (n=4), arthritis (n=3), and cellulitis (n=3). In total, we identified 185 unique iGAS cases, representing an increase of 34% (47/138) compared to the NIDR only.

Public health implications/Conclusions: Our study suggests that the NIDR underestimated the number of paediatric iGAS cases from 2014 to 2023, especially for GAS sepsis. A comprehensive evaluation of the iGAS surveillance system is warranted to tackle underreporting and gain better insights into the paediatric iGAS burden in Finland. This might facilitate identification of at-risk groups and the implementation of targeted prevention measures. This study showed that the continued monitoring of the epidemiological situation in Finland is essential to detect new surges in infectious diseases and to identify changes associated with severe outcome.

Role: Joana led the development of this surveillance project from conception to completion. She formulated the study protocol including the research objectives and methodology. She coordinated, prepared and submitted all required documentation for the THL research permission application to obtain necessary data access. She developed the analysis plan and wrote the R scripts for data processing, dataset merging and statistical analysis. She was responsible for data quality management as well as merging and performing extensive data cleaning to ensure the integrity of the dataset. Joana conducted all statistical analyses in R, interpreted the results, and drew evidence-based conclusions from the findings. She authored and submitted an abstract to ESCAIDE 2024 as the first author, which was accepted for oral presentation and presented by her (see, '4.3. Conference presentations'). Additionally, she prepared a comprehensive surveillance report summarising the study findings and their public health implications (see, '4.2. Other reports').

1.2.2. Epidemiological trends, severity and surveillance gaps of paediatric invasive group A streptococcal infections (iGAS) in Finland: a population registry-based study, Finland, 2014–2023

Supervisor: Emmi Sarvikivi (THL)

Type of project: Analysing data from a surveillance system

Aim: To describe the national trends and surveillance gaps of paediatric iGAS infections in Finland from 2014 to 2023.

Methods: We conducted a population-registry-based study using iGAS laboratory notifications reported to the NIDR and clinical iGAS cases reported to the HDR. We included data on children aged 0–17 years from 1 January 2014 to 31 December 2023. We performed descriptive analysis on age, sex, GAS *emm*-type and calculated crude incidences and case-fatality proportion (CF), by year. We also investigated trends in iGAS incidence before and after the coronavirus 2019 (COVID-19) pandemic.

Results: A total of 185 iGAS cases in children were reported during the study period, median age of six years (interquartile range (IQR): 2–10), 52% of them were male. Annual crude incidence varied from 1.7 to 3.1/100 000 population in non-COVID years, with the highest incidence in 2019, followed by 2023. The incidence dropped steeply in COVID-19 years (0.7 to 0.8/100 000 population). and post-pandemic incidence did not exceed pre-pandemic levels. *Emm*1 (n=49, 36%), *emm*28 (n=26, 19%) and *emm*12 (n=22, 16%) were the most frequent *emm*-types in the total iGAS isolates. The distribution of *emm*-types differed significantly between the pre-COVID (n=103) and post-COVID (n=25) periods (p=0.002). The proportion of *emm*1 decreased post-COVID from 41% to 28%, while *emm*12 increased (14% to 24%). The steepest decrease was observed for *emm*28 (23% to 4%). Emerging trends included the appearance of *emm*59 (8%) and a higher proportion of *emm*4 (7.8% vs. 20%) in the post-COVID period, whereas *emm*89 was not detected post-COVID (7.8% vs. 0%). Among the 134 HDR cases, 118 (88%) were hospitalised. The median hospital length of stay was seven days (IQR: 3–11, range 1–66 days), with 40 cases (34%) hospitalised for more than 10 days. Four deaths occurred within 30 days (CF: 2.9%) after iGAS diagnosis. CF differed significantly between pre- and post-COVID-19 periods (0% vs. 15%).

Public health implications/Conclusions: The post-COVID paediatric iGAS incidence was similar to previous years. We found differences in *emm*-type distribution through the years, *emm*1 and *emm*12 being the most frequently isolated types after pandemics. This study represents the first step to thoroughly explore this public health problem in Finland. A further assessment covering all age groups is required to better identify epidemiological and molecular shifts.

Role: Joana took the lead in developing the study protocol, including formulating the research objectives and designing the methodological approach. She prepared and submitted all necessary documentation for data permit applications to ensure regulatory compliance. She developed the analysis plan and was responsible for data quality management throughout the study. She performed data cleaning procedures and conducted all statistical analyses using R software. Joana interpreted the analytical results and formulated evidence-based conclusions from the study findings. She also authored a scientific manuscript submitted to a peer-reviewed journal based on the study results (see, '4.1. Manuscripts published in peer-reviewed journals').

Routine surveillance activities

Elaboration of an internal standard of procedures (SOP) on measles case detection in an international context, THL, Helsinki, 2025

Activities and role: Joana was part of a working group, comprising five experts from the Preparedness Team (Public Health Department, THL), which elaborated an internal SOP on measles case detection, under the scope of their activities and tasks, from 11 February to 31 August 2024. Together with the EPIET fellow, Maria Francesca Manca, Joana led the activity, which included: planning and chairing the meetings; articulating with consulting peers; and writing of the final documents in English (see, '4.2. Other reports').

Routine activities of the international health regulations (IHR) focal point, THL, Helsinki, 2025

Activities and role: Joana participated for two days in the routine activities of the national IHR focal point of THL, screening notifications and events from the European surveillance portal for infectious diseases (EpiPulse), the Early Warning and Response System of the European Union (EWRS), IHR platforms, and ECDC weekly threat reports. Joana navigated the official platforms, and together with the focal point presented weekly situation reports/summaries of events for week 8, 2025 at the outbreak meeting (see, '4.4. Other presentations').

2. Applied public health research

2.1. Increasing number of bloodstream infections among people who inject drugs in Finland: a population registry-based study, Finland, 2019–2023

Supervisors: Lotta Siira (THL), Emmi Sarvikivi (THL), Outi Lyytikäinen (THL)

Aim: To describe bloodstream infections (BSIs) and causative microbes among people who inject drugs (PWID) in Finland in 2019–2023 and to assess changes over time in order to increase awareness and identify targets for interventions.

Methods: We used data from three national registers linked by personal identifiers. We identified BSI episodes from the infectious diseases register, PWIDs from the hospital discharge and outpatient care registers, and date of death from the population register. ICD-10 code F11 (Opioid-related disorders) was used as a proxy for PWID, predating the BSI episode for up to two years. We analysed demographics, microbial characteristics, and case fatality proportion (CF) within 30 days of positive blood culture.

Results: In total we identified 95 835 BSI episodes of which 1 532 (1.6%) were among 1 162 PWID. Of these, 1 009 (66%) were among males, 75 (5%) were foreign-born, and median age was 35 years (IQR: 28–42 years). Of the PWID, 20% had ≥2 BSI episodes. Of the BSIs, 173 (11%) were polymicrobial. The most common microbes were *Staphylococcus aureus* (36%), *Bacillus cereus* (9%) and *Streptococcus pyogenes* (8%). Of all *S. aureus* BSIs, 61 (9%) were caused by methicillin-resistant *S. aureus* (MRSA). Thirty-day CF was 2.7%; 21/42 were aged <40 years. In 2019–2023 the annual number and proportion of all BSIs increased from 214 (1.1%) to 403 (2%), with an average annual increase of BSIs of 1.72 (95% CI: 1.13–1.22), indicating a statistically significant increasing trend in BSIs over time ($p<0.0001$). Thirty-day CF increased from 1.4% to 3.7%, with an average annual increase of 1.27 (95%CI, 1.01–1.60), indicating a statistically significant increasing trend in CF over time ($p<0.05$).

Public health implications/Conclusions: The two-fold increase in BSIs and three-fold increase in CF among PWID as well as the young age of this population represent a public health concern that requires infection control interventions and appropriate clinical management. Supervised injection rooms should be considered in Finland. Microbiological findings can be used when updating treatment guidelines for PWID.

Role: Joana was responsible for designing the research framework, establishing the study objectives and defining the methodological approach. She coordinated, prepared and submitted all required documentation for the THL research permission application to obtain necessary data access. She created the statistical analysis strategy and oversaw data quality assurance processes throughout the project. She executed data preparation procedures, dataset merging, and carried out all analyses using R programming. Joana synthesised the analytical findings and developed key insights and recommendations based on the research outcomes. She wrote a final report on the research study results (see, '4.2. Other reports') and served as the first author of abstracts accepted for two international conferences.

She recently presented a poster at the 18th European Public Health Conference (EPH) in November 2025 (see, '4.3. Conference presentations'). She is the first author in a forthcoming manuscript resulting from this research, to be submitted to a peer-reviewed journal after the fellowship (see, '4.1. Manuscripts published in peer-reviewed journals').

2.2. Spatial distribution of tick-borne encephalitis (TBE) by tick-borne encephalitis virus (TBEV) subtypes and their association with disease severity: a cohort study, Finland, 2022–2024

Joana discontinued this project after the preparation phase due to THL administrative constraints. It will be continued by the EPIET fellow, Maria Francesca Manca (Cohort 2024), in the future.

Supervisors: Lotta Siira (THL), Liina Voutilainen (THL)

Aim: To describe the spatial distribution of TBE cases by circulating TBEV subtypes (TBEV-Eu and TBEV-Sib) in Finland, from 2022 to 2024, and to assess whether the subtypes impact on the severity of the disease.

Methods: We will conduct a retrospective cohort study consisting of human laboratory-diagnosed TBE cases in Finland in 2022–2024. All IgM anti-TBEV-positive serum and cerebrospinal fluid (CSF) samples stored at the Helsinki and Uusimaa Hospital District (HUS) Diagnostic Centre, Turku University Hospital (Tyks) laboratory, and Åland Health and Medical Care (ÅHS) laboratory in 2022–2024, will be tested at HUS by an in-house subtype-specific μ-capture IgM immunoassay, to distinguish between TBEV-Eu and TBEV-Sib. No new patient specimens will be collected. The subtyping findings will be combined with case-based data from national health registries and individual health questionnaires to assess the association of subtypes with disease severity. Laboratory, registries and questionnaire data will be linked with unique personal identifiers.

Results: The project was restricted to the protocol phase and will not be further conducted in the course of Joana's fellowship due to administrative constraints which put the project on hold from March to November 2024. The project will be continued by the EPIET fellow, Maria Francesca Manca, Cohort 2024.

Public health implications/Conclusions: This study will be important to fill a gap in knowledge regarding the distribution and severity of TBE according to TBEV subtypes in Finland. It will allow the eventual replication of the study in other countries for comparison and contribute to the creation of public health evidence to target tailored prevention interventions.

Role: Joana initiated this research project by conducting preparatory work and performing literature review to establish the scientific foundation. She authored the initial study proposal and presented the concept to external research partners to secure their engagement and support, which included the Helsinki University Hospital-Diagnostic Centre, University of Turku, Åland Health and Medical care, and Åland Group for Borreliosis Research. She developed the research protocol, presented it to the intersectoral research team, and took the lead in organising and facilitating meetings with them. She will be involved in the next steps of the project after the fellowship.

3. Teaching and pedagogy

Lectures and case studies for the course, 'Essentials of Infectious Disease Epidemiology', University of Tampere, Finland, 2024

EPIET/EUPHEM fellows (Cohorts 2022 and 2023) based in the THL organised and taught a one-week course on 'Essentials of Infectious Disease Epidemiology' aimed at postgraduate students at Tampere University, Finland. Joana was involved in all aspects of the course including planning, designing the curriculum, developing training materials, teaching, facilitating, and conducting morning revision sessions. She prepared and delivered three lectures, as well as facilitated four case studies on outbreaks and surveillance of infectious diseases. Students' feedback was collected via an electronic questionnaire, and an evaluation report and reflective note were prepared.

Lectures and case studies for the event, 'Outbreak Investigation Day (OID)', Helsinki, Finland, 2024

EPIET/EUPHEM fellows based in the THL organised and taught a one-day course for the event, 'Outbreak Investigation Day (OID)' at THL to enhance staff knowledge on outbreak investigations. The event included lectures on outbreak investigations and study designs, and a case study in smaller groups to promote multidisciplinary thinking and collaboration between epidemiologists and microbiologists. Joana was involved in all aspects including organising the course, developing the material, delivering lectures, facilitating the case study, and preparing an evaluation survey. An evaluation report and a reflective note were prepared and disseminated among participants.

EU Twinning Project training implemented by the THL and the Institute of Public Health of Serbia "Dr Milan Jovanović Batut", Belgrade, Serbia, 2024

See 'International Assignments' section.

Participation in the incubator workshop for the Emergency Preparedness Integrated Courses (EPIC11) project, Sofia, Bulgaria, 2025

Incubator workshops under the EPIC11 EU-project develop and organise training programmes under the EU Health Preparedness Training Programme to be delivered to EU Member States in the future, under Article 11 of Regulation (EU) 2022/2371 on serious cross-border threats to health. Joana participated in the last incubator workshop of the project, held from 1 to 5 February 2025 in Sofia, Bulgaria. In this training activity, she participated in the validation and development of training material, training methods to be applied, target audience suitability, piloting of training modules, evaluation of case studies content. She wrote an activity report integrating a reflection about the works (see, '4.2. Other reports').

4. Communications related to the EPIET/EUPHEM fellowship

4.1. Manuscripts published in peer-reviewed journals

- Kitowska W, Gonzalez-Perez AC, **Sequeira Neto J**, Kanerva M, Kaukavuori H, Lindström I, et al. Second reported outbreak of pneumococcal pneumonia among shipyard employees in Turku, Finland, August – October 2023: a case–control study. Epidemiology and Infection. 2025;153:e32. Available at: https://doi.org/10.1017/S0950268824001870
- **Sequeira Neto J**, Ollgren J, Hyyryläinen HL, Sarvikivi E. Underestimation of paediatric invasive group A streptococcal infections in Finland: trends and surveillance gaps from a population registry-based study, 2014–2023 (tentative title). [in preparation, to be submitted to a peer-reviewed international journal]
- Manca MF, Silvola J, Czarnecki J, **Sequeira Neto J**, Kanerva M, Kaukavuori H, González Pérez AC, Lindström I, Frilander H, Fomichev M, Marttila H, Ratia R, Lakoma L, Siira L. Third Streptococcus pneumoniae disease outbreak involving serotype 4–ST801 in a shipyard, Finland, May to June 2025. Euro Surveill. 2025;30(41):pii=2500758. Available at: https://www.eurosurveillance.org/content/10.2807/1560-7917.ES.2025.30.41.2500758
- **Sequeira Neto J**, Siira L, Ollgren J, Sarvikivi E, Lyytikäinen O. Increasing number of bloodstream infections among people who inject drugs in Finland, 2019–2023 (tentative title). [in preparation, to be submitted to a peer-reviewed international journal].

4.2. Other reports

- **Sequeira Neto J**, Landgren H, Rimhanen-Finne R. Outbreak report: Hepatitis E outbreak in Finland January–September 2024: a series of case–control studies. Helsinki: THL; 2025. [Confidential]
- **Sequeira Neto J**, Ollgren J, Hyyryläinen HL, Sarvikivi E. Surveillance report: Underestimation of surveillance system and comparison with hospital register of paediatric invasive group A streptococcal infections in Finland, 2014–2023. Helsinki: THL; 2025. [Shared with stakeholders]
- **Sequeira Neto J**, Ollgren J, Siira L, Sarvikivi E, Lyytikäinen O. Study report: Increase in bloodstream infections and case fatality among people who inject drugs, Finland, 2019–2023: a population-based cohort study. Helsinki: THL; 2025. [Shared within THL]
- **Sequeira Neto J**. Activity report: EPIC11 incubator workshop, Sofia, Bulgaria. Helsinki: THL; 2025. [Shared with the Preparedness Team, THL]
- **Sequeira Neto J***, Manca MF*, Nyqvist A, Silvola J, Lakoma L. Internal Standard of Procedures (SOP): Measles detection and control in international context. Helsinki: THL; 2025. [Shared with the Department of Public Health, THL] *Shared first authorship.

4.3. Conference presentations

- Kitowska W, Gonzalez-Perez AC, **Sequeira Neto J**, Kanerva M, Kaukavuori H, Lindström I, et al. Pneumococcal pneumonia outbreak at a shipyard in Turku, Finland, August–October 2023 (oral presentation as invited speaker). Presented at the Microbe Cruise II; 4 September 2024; Turku, Finland. Presenter: Kitowska W.
- **Sequeira Neto J**, Ollgren J, Hyyryläinen HL, Sarvikivi E. Current surveillance system underestimated paediatric invasive Group A Streptococcal disease in Finland: a population registry-based study, 2014–2023 (oral presentation). Presented at the European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE) 2024; 20–22 November 2024; Stockholm, Sweden. Presenter: **Sequeira Neto J**.
- **Sequeira Neto J**, Siira L, Ollgren J, Sarvikivi E, Lyytikäinen O. Increasing number of bloodstream infections among people who inject drugs in Finland, 2019–2023 (poster). Presented at ESCAIDE 2025; 19–21 November 2025; Warsaw, Poland. Presenter: **Sequeira Neto J**. [abstract retrieved]

- **Sequeira Neto J**, Siira L, Ollgren J, Sarvikivi E, Lyytikäinen O. Bloodstream infections among persons who inject drugs in Finland, 2019–2023 (poster). Presented at the 18th European Public Health Conference; 12–14 November 2025; Helsinki, Finland. Presenter: **Sequeira Neto J**.

4.4. Other presentations

4.4.1. Lectures and external presentations

- **Sequeira Neto J**. Outbreak investigation – principles and examples (lecture). Presented at: 'Essentials of Infectious Disease Epidemiology' course at University of Tampere; 6 February 2024; Tampere, Finland.
- **Sequeira Neto J**. Study designs (lecture). Presented at: 'Essentials of Infectious Disease Epidemiology' course at University of Tampere; 6 February 2024; Tampere, Finland.
- **Sequeira Neto J** and Kitowska W. Pandemic control, part 2 (lecture). Presented at: 'Essentials of Infectious Disease Epidemiology' course at University of Tampere; 8 February 2024; Tampere, Finland.
- **Sequeira Neto J**. Trends in invasive group A streptococcal (iGAS) infections amongst children in Finland from 2014 to 2023: a retrospective surveillance-based observational study: study protocol (oral presentation). Presented at: Nordic Mini Project Review Module; 29 February 2024; Helsinki, Finland.
- **Sequeira Neto J**. 10 steps of an outbreak investigation (lecture). Presented at: 'Outbreak Investigation Day' training at THL Tilkanmäki; 18 March 2024; Helsinki, Finland.
- **Sequeira Neto J**. 10 steps of an outbreak investigation (lecture). Presented at: 'Strengthening the capacity of Serbia's healthcare for communicable disease surveillance': Module 1 and 2 training at the Institute of Public Health of Serbia "Dr Milan Jovanović Batut"; 22 May 2024; Belgrade, Serbia.
- **Sequeira Neto J** & Kitowska W. Study designs (lecture). Presented at: 'Strengthening the capacity of Serbia's healthcare for communicable disease surveillance' – Modules 1 and 2 training at the Institute of Public Health of Serbia "Dr Milan Jovanović Batut"; 22 May 2024; Belgrade, Serbia.
- **Sequeira Neto J**. Current Surveillance system underestimated paediatric invasive Group A streptococcal disease in Finland: a population registry-based study, 2014–2023 (oral presentation). Presented at: Project Review Module; 26 August 2024; Lisbon, Portugal.
- **Sequeira Neto J**. Hepatitis E outbreak in Finland, 2024 – Epidemiological investigation: preliminary results (oral presentation). Presented at: weekly outbreak meeting with participants and stakeholders; 17 October 2024; Helsinki, Finland.
- **Sequeira Neto J**. Bloodstream infections in non-injecting and injecting drug users in Finland, 2019–2023: study protocol and preliminary results (oral presentation). Presented at: Nordic Mini Project Review Module; 13 March 2025; Stockholm, Sweden.
- **Sequeira Neto J**, Nyqvist A. Week 8: EpiPulse, EWRS and IHR events; Presented at: weekly outbreak meeting with external participants and stakeholders; 8 February 2025; Helsinki, Finland.
- **Sequeira Neto J**. Hepatitis E outbreak in Finland, 2024 – Epidemiological investigation: final results (oral presentation). Presented at: weekly outbreak meeting with external participants and stakeholders; 24 June 2025; Helsinki, Finland.

4.4.2. Presentations at internal meetings at THL

- **Sequeira Neto J**. Invasive group A streptococcal infections amongst children in Finland: project proposal (oral presentation). Presented at: bi-weekly EPIET/EUPHEM meeting; 2 November 2023; Helsinki, Finland.
- **Sequeira Neto J**. Hepatitis E outbreak in Finland, outbreak investigation update: 1–31 January 2024 (oral presentation). Presented at: HEV outbreak team meeting; 2 February 2024; Helsinki, Finland.
- **Sequeira Neto J**. TBE: subtypes distribution and disease severity – project proposal (oral presentation). Presented at: bi-weekly EPIET/EUPHEM meeting; 19 June 2024; Helsinki, Finland.
- **Sequeira Neto J**. Current Surveillance system underestimated paediatric invasive Group A streptococcal disease in Finland: a population registry-based study, 2014–2023 – preparation for ESCAIDE (oral presentation). Presented at: bi-weekly EPIET/EUPHEM meeting; 14 November 2024; Helsinki, Finland.
- **Sequeira Neto J**. Bloodstream infections in non-injecting and injecting drug users in Finland, 2019–2023: study protocol and preliminary results (oral presentation). Presented at: bi-weekly EPIET/EUPHEM meeting and drug-expert group meeting; 2 April and 13 May 2025; Helsinki, Finland.

5. EPIET/EUPHEM modules attended

- Introduction to R for Applied Epidemiology (14h), Applied Epi, 19–22 September 2023, virtual
- Introductory Course, 25 September–13 October 2023, Spetses, Greece
- Study Protocol and Scientific Writing, 26–27 October and 7–8 November 2023, virtual
- European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE) 2023, 22–24 November 2023, Barcelona, Spain
- Multivariable Analysis, 19–23 February 2024, Berlin, Germany
- Vaccinology, 4–8 March 2024, virtual
- Writing Abstracts for Scientific Conferences, 14–20 March 2024, virtual
- Rapid Assessment and Survey Methods, 15–19 April 2024, Dublin, Ireland
- Public Health Microbiology I – Basic phylogeny, 17–18 June 2024, virtual
- Project Review Module, 26–30 August 2024, Lisbon, Portugal
- European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE) 2024, 20–22 November 2024, Stockholm, Sweden
- Ethics included in *Study Protocol, Ethics, and Scientific Writing*, 6 November 2024, virtual
- Time Series Analysis, 9–13 December 2024, Utrecht, the Netherlands
- Social Behavioural Sciences, 24–28 March 2025, virtual
- Leadership and Communication in Public Health, 1–3 September 2025, Lisbon, Portugal
- European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE) 2025, 19–21 November 2025, Warsaw, Poland

6. Other training

- Risk management in the digital world, eOppiva, 17 September 2023, virtual
- ABC of data protection for public administration personnel, eOppiva, 17 September 2023, virtual
- Digitally secure working life, eOppiva, 17 September 2023, virtual
- Nordic Mini Project Review Module, 29 February–1 March 2024, Helsinki, Finland
- Public health Preparedness for Mass Gatherings, WHO, 15 April 2024, virtual
- Webinar: EU Health Task Force, European Centre for Disease Prevention and Control, 17 June 2024, virtual
- Rapid Risk Assessment e-Learning course, ECDC, 20 June 2024, virtual
- Social and behavioural sciences for the prevention of infectious diseases, webinar series:
    - Webinar 1: Health literacy in the prevention of infectious diseases, 26 June 2024, virtual
    - Webinar 2: Social and behavioural science in action: shaping public health strategies for infectious disease prevention, 25 September 2024, virtual
    - Webinar 3: Building and maintaining trust in policies, programmes and communication for infectious disease prevention, 8 November 2024, virtual
    - Webinar 5: Behavioural science in action: using behavioural science to counteract antibiotic resistance, 27 January 2025, virtual
    - Webinar 6: Breaking barriers for women: the role of behavioural and structural factors in HIV prevention, 5 March 2025, virtual
- PETAL Seminars:
    - The Health Economics seminar, 24 October 2024, virtual
    - Assessing abstracts with the ECDC CROWD, 28 November 2024, virtual
    - Infodemic Management, 23 January 2025, virtual
    - Using AI in everyday epidemiology: an introduction, 26 May 2025, virtual
- Evaluating the study question (Manuscript review series): e-learning, ECDC, 11 October 2024, virtual
- Introduction to evidence based public health (EBPH): one-day pre-conference workshop – ESCAIDE 2024, 19 November 2024, Stockholm, Sweden

- Evaluating diversity in infectious disease epidemiological observational studies (Manuscript review series): e-learning, ECDC, 7 February 2025, virtual
- Evaluating completeness of study reporting (Manuscript review series): e-learning, ECDC, 7 February 2025, virtual
- Nordic Mini Project Review Module, 13–14 March 2025, Stockholm, Sweden
- Epidemic intelligence e-learning course, ECDC, 16 May 2025, virtual

7. International assignments

EU Twinning Project training implemented by the THL and the Institute of Public Health of Serbia "Dr Milan Jovanović Batut", Serbia, 2024

Joana participated in a five-day deployment (20–24 May 2024) mission to the Institute of Public Health of Serbia "Dr Milan Jovanović Batut" in Belgrade, Serbia, as part of the THL EU Twinning Project, 'Strengthening the capacity of Serbia's healthcare for communicable disease surveillance'. She supported the THL team in activities leading up the twinning activity, including creation of the course programme, development of training materials (lectures, case studies, exercises), and pre-training consultations and preparations with Serbian colleagues. During the assignment, Joana conducted two training-of-trainers modules (Modules 1 and 2) for epidemiologists and microbiologists from the Serbian network of public health institutions. The trainings took place on 21–23 May 2024 at the institute and were accredited by the European Accreditation Council for Continuing Medical Education (EACCME). Joana took part in post-training discussions, as well as a review of evaluation forms, preparation of the mission report, and wrote a news item for the project's webpage. She also summarised the evaluation results and prepared a reflective note.

8. Other activities

- Attended weekly internal outbreak meetings, 2023–2025, on-site at THL, Helsinki, Finland
- Attended bi-weekly internal EPIET/EUPHEM meetings, 2023–2025, on-site at THL, Helsinki, Finland
- Attended WastPan Project Final Seminar, 26 October 2023, on-site at THL, Helsinki, Finland
- Presented an elevator pitch on 'ECDC EPIET Fellowship' at LOSKA, 31 October 2023, on-site at THL, Helsinki, Finland
- Visited the Meyer Turku, Turku Shipyard site to recruit case–control study participants, 16 November 2023 and 28 May 2025, Turku, Finland
- Participated in the National Immunisation Technical Advisory Group (NITAG) twinning visit to THL integrated in VESRA (Vaccine Evidence Synthesis and Review Activities), 11–16 December 2023, on-site at THL, Helsinki, Finland
- Attended the 'Planetary Health' scientific seminar, on-site THL, 28 February 2024, Helsinki, Finland
- Planned, organised and conducted the Nordic Mini Project Review Module (NMPRM) 2024, 29 February–1 March 2024, Helsinki, Finland [with evaluation report]
- Prepared and published a news item for THL intranet about the Nordic Mini Project Review Module (NMPRM) 2024, 3 April 2024, virtual
- Planned and organised the social programme for participants of the PRM module in Lisbon, June–August 2025, virtual, Helsinki, Finland
- Reviewed a news item for the EU project website about the EU Twinning Project 'Strengthening the capacity of Serbia's healthcare for communicable disease surveillance' mission to Belgrade, Serbia, 11 June 2024, virtual
- Supported the testing of digital tools created by the EU Horizon MOOD (MOnitoring Outbreaks for Disease surveillance in a data science context) project and providing feedback: map application for predicting the occurrence of infectious diseases and a media search engine, 20 June 2024, virtual
- Visited the Vantaa Prison site, 15 August 2024, Vantaa, Finland
- Attended 'Introduction to *TTR* (National Infectious Diseases Register) for EPIET/EUPHEM Fellows' at THL, 2 December 2024, Helsinki, Finland
- Attended 'Introduction to Vaccine procurement for EPIET/EUPHEM Fellows' at THL, 28 January 2025, Helsinki, Finland

- Co-reviewed a manuscript for *Eurosurveillance*, 4–17 February 2025, virtual
- Attended 'Introduction to *Hilmo/AvoHilmo* introduction for EPIET/EUPHEM Fellows' at THL, 26 February 2025, Helsinki, Finland
- Visited the site, clinical microbiology laboratory of the Hospital district of Helsinki and Uusimaa (HUS) Diagnostic Centre, 19 March 2025, Helsinki, Finland
- Visited the site, Neulanen Research Centre, THL (i.e. the Environmental Health Unit and the Water Microbiology team), 8 April 2025, Kuopio, Finland

Acknowledgements

I am truly honoured to have had the opportunity to participate in the ECDC EPIET Fellowship. I would like to express my sincerest thanks to my main and co-supervisors – Lotta Siira, Timothée Dub, Sohvi Kääriäinen, and Emmi Sarvikivi – for their exceptional guidance, motivation, and unwavering support throughout this journey. Lotta, I am especially grateful for your constant availability over these two years and for ensuring that each project not only met the programme's expectations but also contributed significantly to my growth as a professional. Outi Lyytikäinen, I deeply appreciate your expertise, insightful feedback, and invaluable contributions to my work. I also want to thank all my colleagues at the Preparedness Team and across the THL for their daily support, collaboration, and the wonderful camaraderie that made my experience so enriching.

A special note of gratitude goes to my frontline coordinator, Barbara Schimmer, for her indispensable scientific advice, encouragement, and always being there to address my questions and concerns. I am also very thankful to Joana Gomes Dias for her time and expertise in providing statistical and R support throughout my fellowship projects.

To my fellow EPIET trainees and dear friends – Ana Cristina González Pérez, Wioleta Kitowska, Maria Francesca Manca, and Jakub Czarnecki – thank you for the countless hours we shared in the office, working, learning, and supporting each another. Cristina and Wioleta, I am especially grateful to have begun this incredible journey with you, sharing not only the challenges of the fellowship but also countless adventures and memories beyond it. The bonds we formed during this time are truly precious to me.

Lastly, to my dear 2023 EPIET/EUPHEM/MediPIET Cohort – thank you all for making this fellowship programme a truly once-in-a-lifetime experience that I will cherish forever and have everlasting memories of.