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ESO Emerging Leaders Programme FINAL REPORT

In November 2023, I had the honor of being selected as one of three participants of the first ESO Emerging Leaders Programme cohort. This opportunity has provided me with a strong platform for both professional growth and personal development, enabling me to deepen my understanding of stroke care challenges across Europe, strengthen my leadership skills, and learn directly from leading European stroke physicians. Throughout the programme, I have expanded my academic and professional activities, developed valuable networks for scientific collaboration, and applied these experiences to support ongoing improvements in stroke care in Lithuania.

A central benefit of the programme has been the mentorship and collaborative opportunities it enabled. Under the guidance of my mentor, Prof. Alastair Webb, we have co-authored two manuscripts examining unexpected mortality patterns in vascular dementia and cerebral small vessel disease; both were submitted in 2025 and are currently under review, with further related work planned for 2026. Prof. Webb also played an important role in supporting my final research project, providing a letter of support that contributed to securing funding through the Lithuanian Research Council's "My First Research Team" programme. This funding will allow me to establish a research team at Vilnius University and build on my Emerging Leaders final project – strengthening stroke care quality monitoring at Vilnius University Hospital and contributing to the development and evaluation of a national Stroke Learning Health System in Lithuania. I am confident that this mentorship will remain instrumental in refining my academic skills and broadening my research horizons in the years ahead.

In this report, I will attempt to describe my three-year experience in the programme, focusing on (1) participation in ESO-affiliated events and activities, (2) returning the learning, and (3) completion of my final project on developing a Learning Stroke Health System in Lithuania.

1. Participation in ESO-Affiliated Events

ESOC 2024 in Basel, Switzerland (participant)

In ESOC 2024, which took place in Basel, I had an opportunity to present an e-poster titled "Quality of Stroke Care in Lithuania and Latvia," which subsequently led to the submission of two original manuscripts on stroke care quality in the three Baltic States; both are currently under review. In addition, I had the opportunity to meet my Emerging Leaders Programme mentor Prof. Alastair Webb

in person for the first time and to discuss future projects as well as my trajectory within the Emerging Leaders Programme. Finally, all three Emerging Leaders were able to attend an eSTEP Board meeting, being able to peak into ESO governance and decision-making in practice.

ESO Stroke Summer School 2024 in Vilnius, Lithuania (organizer, faculty)

In September 2024, we hosted the ESO Stroke Summer School in Vilnius, where I served as one of the three members of the Local Organizing Committee. The event was highly successful and provided an excellent opportunity to support the professional development of early-career stroke physicians from across Europe. I also delivered a presentation on “Monitoring of Stroke Care Performance” and had the chance to meet members of the ESO Executive Committee. The programme facilitated many valuable discussions, several of which have already paved the way for future collaborations.

ESO Focused Workshop on Cerebral Amyloid Angiopathy in Milan, Italy (participant)

Participation in the ESO Focused Workshop on Cerebral Amyloid Angiopathy (CAA) significantly strengthened my expertise in this rapidly evolving field. The knowledge gained has directly supported my professional development and has already been integrated into my academic teaching at Vilnius University, helping me deliver more up-to-date and clinically relevant content to medical students and resident trainees.

The workshop also provided an excellent platform to meet leading experts in CAA and establish contacts for future collaboration. Building on these connections, together with Lukas Sveikata, Prof. Anna Bersano, and colleagues, we submitted a proposal to the Transforming Health and Care Systems (THCS) call for the ENHANCE-CSVD project, focused on preventing stroke and dementia in cerebral small vessel disease. The project was funded (total project costs: 4,107,090 EUR; Lithuanian budget: 150,000 EUR), and starting with May 2026, within the next two years, our collaboration will develop and evaluate brain health monitoring approaches in CSVD using connected wearable devices and digital tools, aiming to enable earlier, more personalized, and scalable prevention strategies. I will serve as the principal investigator for Lithuania.

In addition, at the invitation of Prof. Anna Bersano, I have taken on the role of Secondary Proposer for the Cerebral Amyloid Angiopathy COST Action Network (CONTAINER). If funded, this initiative will establish a virtual European platform to support CAA education, knowledge exchange, and research collaboration. It is designed to address key challenges in the field, including fragmented expertise, unequal access to training opportunities, and limited multidisciplinary integration, ultimately fostering a sustainable pan-European community focused on improving CAA care, education, and collaboration.

Finally, initiated by my Emerging Leaders colleague Marieta Peycheva, I am contributing to the development and dissemination of a Multinational Survey on Diagnostic and Treatment Challenges in CAA as part of her Emerging Leaders Programme project. This work will help map current practice variation and unmet needs across countries, providing a foundation for targeted educational and research initiatives.

ESO Department-to-Department Visit in London, United Kingdom (participant)

In June 2025, my two-week department-to-department exchange under the mentorship Prof. Alastair Webb at Imperial College Healthcare NHS Trust was immensely rewarding, both in terms of expertise and personal insight. The Trust – one of England's largest – spans several hospitals, and I was fortunate to gain firsthand experience at three of them: Charing Cross Hospital, Hammersmith Hospital, and St Mary's Hospital.

Most of my time was spent in Charing Cross Hospital, which is the primary teaching hospital for stroke at the Imperial College School of Medicine, as well as one of the largest comprehensive stroke centers in London. It encompasses all levels of stroke patient care, including the Hyperacute Stroke Unit, Acute Stroke Unit, and multiple secondary stroke prevention clinics.

I am extremely grateful to Dr Sohaa Jamil – clinical lead for the specialty for stroke at Imperial NHS – and Dr Soma Banerjee – the Clinical Director for Stroke and Neurosciences at the Imperial NHS trust, as well as their welcoming colleagues, who have generously carved out time to walk me through the finer details of their stroke care pathway from on-call decision-making and hyper-acute patient care to specialty meetings and the subtleties of discharge planning. As a neurologist, responsible for acute stroke patients in Vilnius, I was keen to discover how optimizing patient flow and updating standard operating procedures for acute stroke treatment could raise the standard of care for patients in Lithuania.

I also had a chance to see video triage in action. In West London, a specialized nurse conducts a live video assessment of most of the acute stroke patients before choosing the most appropriate stroke-ready hospital, supplementing the usual prenotification. I'm grateful to Jonathan Hayton for letting me observe the workflow and for explaining the tool's evolution and future potential. Beyond video triage, I explored additional digital systems that keep patient care moving smoothly – most notably the NHS mobile app, which, among other things, lets clinicians share discharge summaries and schedule follow-up visits while giving patients timely access to the same information.

Prof. Alastair Webb also welcomed me into the Department of Brain Sciences at Imperial College London's Hammersmith Hospital to observe the Imperial Small Vessel Disease Research Group at work. His programme is dedicated to clarifying the condition's underlying mechanisms, refining the tools used to measure its burden, and developing new therapies.

Finally, I got a chance to witness how the Urgent & Emergency Medicine team at St Mary's Hospital turns real-time data into concrete quality-improvement action. Imperial College Healthcare NHS Trust deploys some of the UK's most sophisticated automated dashboards, converting raw metrics into instant, actionable insights. Because I lead Vilnius University Hospital's Clinical Quality Group, this glimpse of best practice was very useful and provided many ideas to take home.

Prof. Webb and his colleagues welcomed me with exceptional warmth. They patiently unpacked the "why" behind their workflows, from organizational design to moment-by-moment clinical decisions. I am very grateful to Dr Webb for arranging the chance to study some of Europe's finest stroke-care practices and for pairing inspiring mentorship with genuine hospitality. The ESO Department-to-Department Visit in London – a full two weeks of observation and dialogue – was both energizing and

eye-opening, and the insights I bring home will be invaluable as we refine acute stroke services in Lithuania.

ESOC 2025 in Helsinki, Finland (faculty)

As part of the Emerging Leaders Programme, I was provided with an opportunity to join the ESOC 2025 Education Committee, where I contributed to the review, selection, and voting process for teaching courses included in the congress programme. This role provided a valuable insight into how high-quality educational content is curated for a major international meeting and allowed me to contribute directly to ESOC's academic offering.

At ESOC, I presented two e-posters based on RES-Q registry data: one examining difference in ischemic stroke patient profiles across the Baltic States, and another comparing stroke care quality indicators across the region. In addition, together with colleagues from Switzerland, we presented a poster entitled "Clinical and Cognitive Outcomes after Bi-thalamic Stroke: Multicenter Artery of Percheron Stroke Registry," highlighting outcomes from a rare stroke syndrome using multicenter data.

For the first time, I also had an opportunity to join the congress faculty and co-chair a Scientific Communications session on Prognosis & Outcomes together with Dr Christine Kremer. This was my first experience chairing a session at a large international congress and provided important practical experience in moderating scientific discussion, managing session timing, and facilitating audience engagement.

Finally, I participated in the investigators' meeting for the I-CATCHER study, a clinical initiative aimed at improving the care of patients with intracerebral hemorrhage. Following this involvement, I took the leadership to become the principal investigator for Lithuania, obtained ethical approval, and now coordinate study implementation across five Lithuanian stroke centers.

ESO Stroke Science Workshop in Garmisch, Germany (participant)

As Emerging Leaders, we were invited to attend the 8th European Stroke Science Workshop, which provided an up-to-date and high-level overview of major advances in clinical, translational, and basic stroke research. The meeting offered substantial networking value, enabling us to connect with researchers across career stages within the ESO research community. In addition, we had the opportunity to present the results of our Emerging Leaders Programme final project during the ESO Executive Committee meeting. This was a particularly valuable opportunity to share our progress with senior leaders in European stroke medicine, receive feedback, and discuss potential next steps.

WISE Webinar 2026 (presenter)

In February 2026, I had the opportunity to deliver a talk on "Priorities and opportunities as a young researcher" at the ESO Women Initiative for Stroke in Europe (WISE) webinar. This was my first presentation in an international webinar format and provided an opportunity to consolidate and communicate my perspective on early-career academic strategy – particularly how to prioritize mentorship, networking, and creation of a coherent vision. It also allowed me to contribute directly to a broader discussion on gender-related disparities in stroke care and the structural challenges that can influence academic career progression.

ESOC 2026 in Maastricht, the Netherlands – to be attended

As part of the Emerging Leaders Programme, I was given the opportunity to participate in the ESO EAST session, an initiative focused on strengthening stroke service organization, promoting evidence-based treatment, and accelerating access to high-quality stroke care across the Eastern European region. This involvement aligns closely with my ongoing efforts to support quality improvement and system-level development in stroke care.

For ESOC 2026, my team and I submitted four abstracts, including two derived from my Emerging Leaders Programme final project: “Combining a large language model with traditional software engineering tools for automated RES-Q registry variable extraction” and “Stroke unit care is associated with better long-term survival after acute ischemic stroke.”

In addition, I was once again invited to join the congress faculty and co-chair a Scientific Session on “Optimizing Pre- and Interhospital Stroke Management” together with Dr Karianne Larsen. This will further strengthen my experience in moderating scientific discussions at an international level and engaging with current evidence and best practices in acute stroke systems of care. Finally, I have once again joined the ESOC 2026 Education Committee, where I contributed to the review, selection, and voting process for the teaching courses included in the congress programme.

ESO Edinburgh Stroke Research Workshop in Edinburgh, United Kingdom – to be attended

Unfortunately, thus far I was unable to accommodate the dates for the ESO Edinburgh Stroke Research Workshop, which brings together European stroke clinicians and researchers to advance understanding of stroke mechanisms and outcomes, and to improve prevention and recovery strategies. I plan to attend the programme in September 2026.

2. Returning the Learning

ESO Emerging Leaders Session at the annual Lithuanian Stroke Association Conference 2025 in Vilnius, Lithuania (organizer, faculty)

The Lithuanian Stroke Association has hosted a dedicated ESO Emerging Leaders Session during its annual stroke conference featuring insightful presentations and dynamic discussions in April 2025. It was joined by my mentor Prof. Alastair Webb and all members of the ESO Emerging Leaders Programme (Marieta Peycheva, Lina Palaiodimou and myself) as faculty, bringing our expertise, insights, and international perspective to Vilnius. The conference brought together over 200 participants, both onsite and online, making our annual stroke conference a great success.

11th Congress of the Bulgarian Association of Neurosonology and Cerebral Hemodynamics in Sofia, Bulgaria (online participation)

Kindly invited by Marieta Peycheva and her colleagues, our Emerging Leaders Programme cohort took part in the 11th Congress of the Bulgarian Association of Neurosonology and Cerebral Hemodynamics in November 2026, where each of us delivered a presentation on a topic of our choice. As the congress coincided with the ESO Stroke Science Workshop in Garmisch, we participated remotely and presented online. I presented on a topic closely related to my Emerging

Leaders Programme final project, named “Towards a Learning Health System in Stroke Care: Insights from Lithuania’s Stroke Care Performance Monitoring.”

The session provided an excellent platform to showcase Lithuania’s experience with stroke care quality monitoring and to place it in a broader European context. It also enabled a valuable exchange on how different countries organize stroke services and leverage digital health infrastructure to support quality improvement. The discussions helped identify common challenges and potential opportunities for cross-country collaboration in data-driven stroke care optimization.

ESO Prehospital Management Guideline Working Group (non-voting member)

Through the Emerging Leaders Programme, I was kindly awarded the opportunity to participate as a non-voting member in the work of the ESO Prehospital Management Guideline Working Group. This opportunity has substantially expanded my insight into international guideline development processes. I attended the ESO Guideline Development Webinar and contributed to all sections of the ESO Prehospital Management Guidelines, including revising PICO questions, refining the search strategy, screening titles and abstracts, conducting full-text screening, resolving conflicts, and reviewing data extraction. The guidelines are expected to be published in 2026.

ESOC 2025 and ESOC 2026 Education Committee (member)

As part of the Emerging Leaders Programme, I was provided with an opportunity to join the ESOC 2025 and 2026 Education Committees, where I contributed to the review, selection, and voting process for teaching courses included in the congress programme. This role provided a valuable insight into how high-quality educational content is curated for a major international meeting and allowed me to contribute directly to ESOC’s academic offering.

ESO Stroke Master department-to-department visit (host)

In June 2025, I was contacted by Dr Olli Suomalainen, a Specialist in Neurology at Helsinki University Hospital and a participant in the ESO Stroke Master Programme at the University of Bern. He sought an opportunity to observe the organisation of stroke care centers in Vilnius and subsequently undertook a short department-to-department visit, which I had the pleasure of hosting.

Lithuanian Stroke Integrated Care Management Committee (member)

In January 2024, I was appointed as a member of the Lithuanian Stroke Integrated Care Management Committee (SICMC), giving me the opportunity to contribute to discussions and decisions shaping the development of stroke care in Lithuania. The role of SICMC is to coordinate stroke care at the national level and to collect and monitor data from stroke treatment centers on acute reperfusion therapy, patient logistics, resource utilisation, diagnostic investigations, rehabilitation, in-hospital complications, case fatality, and other performance indicators in acute ischaemic stroke care. Quarterly reports are submitted to the Ministry of Health of the Republic of Lithuania to identify areas requiring further improvement.

Executive board of the Lithuanian Stroke Association (executive board member)

Since being elected to the Executive Board of the Lithuanian Stroke Association in June 2024, I have been involved in advocating for national-level initiatives to enhance the quality of stroke care in Lithuania. These efforts have included promoting the use of tenecteplase for hyperacute stroke, supporting the introduction of telestroke protocols, and advancing the extension of the treatment window for intravenous thrombolysis nationwide.

Action Plan for the Management of Cardiovascular Diseases (head of the subgroup)

In August 2025, I was appointed to lead the Subgroup on the Management of Cerebrovascular Disorders, Transient Ischaemic Attack, and Acute Cerebrovascular Syndromes as part of the working groups developing the draft Action Plan for the Management of Cardiovascular Diseases of the Ministry of Health of the Republic of Lithuania. Currently under review, the plan outlines the strategic actions to be implemented by the Ministry of Health over the next three years.

Monitoring Committee for the Secondary Use of the Lithuanian Health Data (member)

In 2025, following nomination by the Lithuanian Association of Neurologists, I was elected to the Monitoring Committee for the Secondary Use of Health Data of the Ministry of Health of the Republic of Lithuania. The Committee is primarily responsible for overseeing the secondary use of health data in Lithuania.

Lithuanian State Progress Council "Lithuania 2050" (member)

In June 2025, I was invited by the office of the Prime Minister of the Republic of Lithuania to become a Member of the prestigious Lithuanian State Progress Council *Lithuania 2050*. The Council's function is to monitor the implementation of the progress strategy *Lithuania 2050*, assess the progress achieved in implementing both this strategy and the National Progress Plan, and contribute to other strategic-level planning documents specified in the Law on Strategic Management. In addition, the Council's mission is to promote public discussion on the future of the country and society, the directions of progress, and the ways in which they can be implemented.

Peer review for European Stroke Journal, ESOC 2025 and 2026 as well as the Lithuanian Innovation Agency

Throughout my career, I have remained actively engaged in peer review for international scientific journals. Through the Emerging Leaders Programme, I was involved as a reviewer for the ESOC 2025 and 2026 Abstract Committee, as well as for several international high-impact journals, including the *European Stroke Journal* and *BMJ Open*, among others. In addition, I have served as an expert grant reviewer for Innovation Agency Lithuania, evaluating research and innovation funding applications in Lithuania.

Promotion to Associate Professor at Vilnius University

In my roles as Assistant Professor and Neurology Trainee Supervisor at Vilnius University, I continue to teach and mentor medical students, dentistry students, neurology residents, and colleagues from

primary stroke centres. The competencies developed through the ESO Emerging Leaders Programme have enriched my teaching and mentoring practice. I remain committed to supporting the professional development of neurology trainees and students at Vilnius University. In September 2025, I was promoted to the position of Associate Professor at Vilnius University, further integrating my academic advancement with my leadership trajectory.

Appreciation from the Mayor of Vilnius in 2025

For my contribution relating to the coordination and improvement in the quality of stroke care in Vilnius region, I have been awarded a letter of appreciation from the Mayor of Vilnius in 2025.

Update of the SOP for reperfusion therapy in Vilnius University Hospital

I initiated the revision of the standard operating procedure for intravenous thrombolysis at our Comprehensive Stroke Centre ahead of the publication of the long-overdue updated Lithuanian Stroke Association guidelines. As a result, our center became the first stroke center in Lithuania to implement tenecteplase and to extend the treatment window for intravenous thrombolysis. In addition, I submitted an application for our centre to become the first ESO Stroke Center-certified stroke center in Lithuania.

3. Completion of the Final Project:

The development of a stroke Learning Health System in Lithuania

Despite substantial advances in stroke care, quality improvement efforts worldwide still rely heavily on manual data collection, retrospective audits, and infrequent feedback cycles. These approaches are resource-intensive, slow to respond to emerging problems, and prone to reporting bias. At the same time, widespread adoption of electronic health records (EHRs) and national digital health infrastructures creates new opportunities to embed continuous learning directly into routine care. Lithuania, a small Baltic country with 11 accredited stroke centers, has systematically monitored stroke care performance since 2014. In addition, at Vilnius University Hospital (VUH), we developed fully automated data extraction using in-house EHRs, which enabled dashboards for near-real-time quality monitoring, providing a strong foundation for developing a Learning Health System (LHS) for stroke care. In 2024, the Lithuanian government decided to invest into a data exchange and monitoring platform for medical clusters, creating an opportunity to scale this model to the national level.

My Emerging Leaders Programme final research project **aimed** to describe, design, scale, and implement a national LHS for stroke care in Lithuania that transforms routinely collected clinical data into continuous measurement-learning-improvement cycles across the entire stroke care pathway.

Methods: Lithuania's centralized Digital Health Platform integrates national referrals, discharge summaries, e-prescriptions, mortality data, selected laboratory results, and imaging data. In addition, data from other health-related and administrative registries are available for secondary use through the National Data Lake, governed by the State Data Agency. With the engagement of all relevant stakeholders, we attempted to identify key performance indicators (KPIs) for the Lithuanian Stroke Database, and define the core variables that must be captured from participating hospitals' EHRs. Stroke centers that did not record the required variables needed to adapt their EHR workflows and

data structures to ensure systematic capture at the point of care and extraction from primary data sources. Finally, near-real-time dashboards would enable benchmarking across sites, analyses, and timely feedback loops to support clinical governance, transparency, and evidence-informed decision-making.

Results: We have described the Lithuanian digital health architecture, and the secondary data reuse pathway in two original scientific articles. Through a multi-stage Delphi process involving clinicians, Emergency Medical Services, stroke non-governmental organizations and policymakers, we established a Lithuanian Stroke Database, comprising of 53 KPIs covering prehospital care, acute treatment, early rehabilitation, secondary prevention, and long-term outcomes. The process has been described and the KPIs have been published in as an original article. We have updated VUH EHRs to be suitable for data extraction for variables that have not been included in our previous in-hospital model. As a side quest, structured data was supplemented with a large language model (LLM) to convert unstructured clinical documentation into structured, registry-ready datasets. This approach enabled automated export of a dataset to international registries (e.g., RES-Q) through an API without manual data entry. Preliminary validation suggests performance comparable to, or exceeding, that of trained clinical staff – an abstract detailing it has been submitted to ESOC 2026, and an original article is in progress. Stroke-related variables are automatically extracted from hospital EHRs and, together with data from other hospitals will be used to calculate standardized KPIs at a national level. Data contribution from most Lithuanian stroke centers is anticipated by mid-2026.

Discussion: Lithuania's national LHS for stroke care could demonstrate how a mature digital health ecosystem can transform routine clinical data into continuous learning and improvement. The system is expected to reduce administrative burden, minimize reporting bias, and enable rapid responses to quality gaps. The platform could potentially support research, registry-based clinical trials, and international collaboration, including participation in INSPIRE-STROKE.

Funding for "My First Research Team"

In March 2026, I have been awarded 350,000 EUR in funding through the "My First Research Team" programme, managed by the Lithuanian Research Council. This will allow me to establish a research team at Vilnius University and expand on my ESO Emerging Leaders Programme final project, further strengthening stroke care quality monitoring at Vilnius University Hospital and contributing to the development and investigation of a national Stroke Learning Health System in Lithuania.

4. Final remarks and conclusions

Participating in the ESO Emerging Leaders Programme has been a very important experience in my professional journey. It has helped me grow as a leader, academic, and clinician. The mentorship of Prof. Alastair Webb, the different learning opportunities, and the connections I built with leading European stroke physicians have greatly broadened my perspective. The programme also allowed me to become part of a growing network of future stroke leaders and created opportunities for collaboration in research, international projects, and future funding.

Most of all, the programme has helped me see more clearly how I can apply these experiences to improving stroke care in Lithuania. It has supported my goal of building my own team at Vilnius

University and strengthened my motivation to continue working at the intersection of stroke care and digital health innovation. I am leaving the programme with greater confidence, a stronger professional network, and a clearer sense of how I want to contribute to the field in the years ahead.

Sincerely,

Rytis Masiliūnas

A handwritten signature in blue ink, appearing to read 'Rytis Masiliūnas', with a stylized, cursive script.

Neurologist @ VUH Santaros Klinikos
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