

Designing the future of thrombectomy in Poland: first we must agree on the principles

Michał Karliński¹, Adam Kobayashi^{2,3}, Bartosz Karaszewski⁴, Anna Członkowska¹

¹2nd Department of Neurology, Institute of Psychiatry and Neurology, Warsaw, Poland

²Department of Pharmacology and Clinical Pharmacology, Institute of Medical Sciences Faculty of Medicine – Collegium Medicum Cardinal Stefan Wyszyński University, Warsaw, Poland

³Department of Neurology and Stroke Unit, Mazovian Voivodeship Hospital, Siedlce, Poland

⁴Department of Adult Neurology, University Clinical Center, Medical University of Gdansk, Gdansk, Poland

Adv Interv Cardiol 2022; 18, 1 (67): 1–3
DOI: <https://doi.org/10.5114/aic.2022.116462>

Despite the constant development in all areas of care, ischemic stroke remains one of the leading causes of death and disability [1]. Hyperacute care has become highly oriented toward time-dependent reperfusion therapies, including intravenous thrombolysis (IVT) and, more recently, mechanical thrombectomy (MT) for patients with large vessel occlusion (LVO) [2–5].

Recanalization of the acutely occluded artery in a patient with moderate-to-severe stroke symptoms is critical for the clinical outcome. However, even complete recanalization does not have to result in reperfusion, whereas the reperfusion is not always in time to prevent brain infarct considering the high patient-to-patient variability in collateral status and ischemia-induced cell processes. To achieve a favorable long-term outcome, it is critical to provide high-quality care that is multidisciplinary, coordinated, and extends far beyond the first few hours from the stroke onset [4, 5]. It reflects the problems in treating myocardial infarction in Poland, where the effects gained in the hyperacute phase were largely diluted by the sub-optimal performance of post-discharge care.

In the last three decades, Polish neurologists managed to set up a network of stroke units, successfully implemented IVT (current treatment rate of about 16–17%), and – in the last few years – created regional stroke networks to deliver MT in a drip-and-ship model. The current most important challenges are (i) upgrading the system to enable equal nationwide access to MT, (ii) ensuring high quality of in-hospital processes, and (iii) evaluating performance.

In Poland, the initial implementation stage of MT took the form of a Thrombectomy Pilot Program launched at

the end of 2018 by the Ministry of Health following consultations with invited expert neurologists, cardiologists and radiologists (in alphabetical order: Robert Gil, Adam Kobayashi, Piotr Musiałek, Rafał Niżankowski, Danuta Ryglewicz, Agnieszka Slowik, Jerzy Walecki, Adam Witkowski).

The program was not designed to test the technology itself, as the effectiveness of MT had already been established. Its main idea was to introduce the treatment in a controlled manner, to test the performance of the whole system designed to work in the drip-and-ship model, and to be able to make necessary adjustments avoiding chaotic creation of multiple low-volume inexperienced centers. Thanks to modest reimbursement, the program allowed 18 comprehensive stroke centers across Poland to perform MT 24/7. It is worth noting that even before the program a few neurological centers implemented their regional systems enabling access to MT with no dedicated reimbursement. The Pilot Program has never been considered optimal by the Polish Neurological Society. The Neurological Society and its Cerebrovascular Section have never had any major influence on its design. Nevertheless, from the time perspective, one must admit that the program definitely opened nationwide access to MT and facilitated formation of regional stroke networks.

The reader should be aware that in Poland, the discussion about the desired organizational model and the need to ensure proper qualifications of the interventionist was started by the Polish neurologists and cardiologists 10 years ago [6]. Notably, these were the times when MT and intra-arterial thrombolysis were con-

Corresponding author:

Michał Karliński, MD, PhD, 2nd Department of Neurology, Institute of Psychiatry and Neurology, 9 Sobieskiego St, 02-957 Warsaw, Poland, e-mail: mkarlinski@ipin.edu.pl

Received: 15.05.2022, **accepted:** 16.05.2022.

sidered rescue therapies for non-responders to IVT and had no supporting evidence from clinical trials in terms of clinical outcome. To ensure the competence of ‘thrombectomists’, several countries and scientific societies have developed dedicated training programs [7, 8]. The training is usually scheduled for 24–36 months and distinguishes the educational needs of professionals from different backgrounds (especially radiologists, cardiologists and neurologists). The curriculum includes clinical work in a stroke unit, diagnostic imaging and neurointerventions. It is known that even experienced, board certified interventional neuroradiologists achieve their maximum performance after 100 thrombectomies done as the primary operator [9]. There is still no international consensus about the optimal organizational model that could ensure widespread timely access to MT without resource overconsumption [10]. The dilution of thrombectomies among too many centers will result in a very slow learning curve of individual operators, making the overall outcome worse than in a reasonably centralized system.

In this issue of “Advances in Interventional Cardiology”, Pawłowski *et al.* address the important problem of defining the desired organizational model of hyperacute stroke care in Poland, knowing that the Thrombectomy Pilot Program is coming to an end. The paper includes an extensive non-systematic description of the contemporary Polish thrombectomy system, asks several critical questions and reviews alternative organizational models. In conclusion, it calls for expansion and decentralization of the national system.

The reader needs to note that the manuscript was drafted by a team of cardiologists and neurologists from a non-academic hospital in Wejherowo. The hospital is acknowledged for its very good quality of stroke care (in particular IVT) and has recently started to perform MT outside of the pilot program with no onsite involvement of interventional radiologists. The team from Wejherowo has published a series of 15 cases of stroke patients treated with MT. However, it did not report their long-term outcome and did not mention that some patients are also being referred for MT to the regional comprehensive stroke university center in Gdansk, which may bias the sample [9]. This may raise important concerns about their mandate to make statements at the national level.

This editorial is intended as brief and constructive feedback from the Board of Cerebrovascular Section of the Polish Society of Neurology (SChN PTN) on a few major issues. All authors are experienced stroke neurologists (AK is also a neurointerventionist) who have a long history of research activity and direct involvement in nationwide implementation of evidence-based stroke care [4, 11–14]. The authors strongly believe that developing a consistent and implementable model of hyperacute stroke care needs a consensus – one that is (i) unbiased, (ii) includes healthcare professionals of different back-

grounds, decision-makers and the payer, and (iii) patient-oriented. This is why, before discussing details of the target model of hyperacute stroke care for Poland, it is necessary to agree on a few principals regarding the long-term goals and the current state.

In 2018 the European Stroke Organization (ESO) in cooperation with the Stroke Alliance for Europe (SAFE) created a European Stroke Action Plan (SAP-E) [9]. The SAP-E was intended as a framework for harmonized efforts of all member states to set goals for the year 2030 in seven domains, including organization of stroke services, management of acute stroke and quality assessment.

In terms of ischemic stroke management, by 2030 the SAP-E aims at [9]:

- Treating 90% or more of all patients in a stroke unit as the first level of care (already achieved in Poland).
- Guaranteeing access to recanalization therapies to 95% of eligible patients.
- Decreasing median onset-to-needle times to < 120 min for intravenous thrombolysis and onset-to-reperfusion times to < 200 min for endovascular treatment.
- Achieving IVT rates above 15% (already achieved in Poland), and EVT rates above 5% (almost achieved in Poland).

Thanks to the combined effort of neurologists, radiologists, cardiologists and neurosurgeons who managed to effectively cooperate in individual thrombectomy stroke centers, MT rates in Poland are continuously increasing (from 1% in 2018 to 4.0–4.5% in 2021). Poland is still behind countries with well-developed and highly effective stroke care systems such as the Czech Republic and Slovakia (IVT rates of over 25%, MT rates about 10%) and countries with a much better economic situation such as Sweden (IVT 15%, MT 8%). However, it is in line with the moderately effective systems of Latvia and Lithuania (IVT 14–18%, MT 3–6%), being ahead of Croatia (IVT 14%, MT 2%) and Romania (IVT 5%, MT < 1%) (ESO-EAST Workshops, Lyon, France, 3.05.2022). Considering the limited design of the pilot program, the several-year delay compared to Western countries and the COVID-19 pandemic, the current stage of MT implementation can be considered satisfactory. Pomerania is one of the regions where the program has been performing particularly well.

Relating the desired number of MT to the overall population tends to oversimplify the important issues of level of urbanization, population density and transfer times. In large agglomerations with a short ambulance transport time, such as Warsaw, two high volume and always operational centers would suffice to cover the 2 million population. One or two centers in Silesia may also be enough. For instance, the stroke network in Stockholm (about 1.6 million population) operates with a single high volume thrombectomy center. Therefore we fully agree about thinking at the regional level and balancing

between accessibility to MT, delays, quality of care and available resources.

We wish Poland to achieve the highest possible level of care with low stroke incidence and a high proportion of patients achieving an excellent long-term outcome. One of the tasks of the recently formed National Council for Neurology at the Ministry of Health is to provide an in depth and objective review of the pilot program and then agree on the further steps in implementation. Bearing in mind that (i) acute and post-acute stroke care is a complex issue, (ii) MT is not a substitute for IVT, and (iii) MT is one of multiple steps for LVO patients, we fully agree that the national system for MT needs optimization. Optimization driven not solely by the number of procedures but also by the performance quality, including the ability to select the patient in an extended window based on advanced imaging protocols [2–5], and optimization supported by a multidisciplinary and unbiased consensus.

Conflict of interest

The authors declare no conflict of interest.

References

- Ding Q, Liu S, Yao Y, et al. Global, Regional, and National Burden of Ischemic Stroke, 1990–2019. *Neurology* 2022; 98: e279-90.
- Berge E, Whiteley W, Audebert H, et al. European Stroke Organisation (ESO) guidelines on intravenous thrombolysis for acute ischaemic stroke. *Eur Stroke J* 2021; 6: I-LXII.
- Turc G, Bhogal P, Fischer U, et al. European Stroke Organisation (ESO) – European Society for Minimally Invasive Neurological Therapy (ESMINT) Guidelines on mechanical thrombectomy in acute ischaemic stroke endorsed by Stroke Alliance for Europe (SAFE). *Eur Stroke J* 2019; 4: 6-12.
- Błażejewska-Hyżorek B, Czarnuszenko A, Członkowska A, et al. Wytoczne postępowania w udarze mózgu. *Pol Przegląd Neurol* 2019; 15 (suppl A): A1-155.
- Powers W, Rabinstein A, Ackerson T, et al. Guidelines for the Early Management of Patients With Acute Ischemic Stroke: 2019 Update to the 2018 Guidelines for the Early Management of Acute Ischemic Stroke: A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association. *Stroke* 2019; 50: e344-e418.
- Kobayashi A. Endovascular approaches for acute ischaemic stroke: the current evidence and organizational issues. *Adv Interv Cardiol* 2012; 3: 216-24.
- Lenthall R, McConachie N, White P, et al. BSNR training guidance for mechanical thrombectomy. *Clin Radiol* 2017; 72: 175.e11-8.
- Sacks D, AbuAwad MK, Ahn SH, et al. Society of Interventional Radiology Training Guidelines for endovascular stroke treatment. *J Vasc Interv Radiol* 2019; 30: 1523-31.
- Zhu F, Ben Hassen W, Bricout N, et al. Effect of operator's experience on proficiency in mechanical thrombectomy: a multicenter study. *Stroke* 2021; 52: 2736-42.
- Karliński M. To drip or to mothership – the ongoing race for stroke thrombectomy. *Pol J Neurol Neurosurg* 2021; 55: 416-7.
- World Health Organization. Regional Office for Europe, European Stroke Council, Council ES. Pan European consensus meeting on stroke management: report, Helsingborg, Sweden, 8-10 November 1995 1996. doi:10.3109/11038129509106810.
- Mikulik R, Caso V, Bornstein NM, et al. Enhancing and accelerating stroke treatment in Eastern European region: methods and achievement of the ESO EAST program. *Eur Stroke J* 2020; 5: 204-12.
- Członkowska A, Niewada M, Sarzyńska-Długosz I, et al. Ten years of stroke programmes in Poland: where did we start? Where did we get to? *Int J Stroke* 2010; 5: 414-6.
- Fiehler J, Cognard C, Gallitelli M, et al. European recommendations on organisation of interventional care in acute stroke (EROICAS). *Eur Stroke J* 2016; 1: 155-70.