

In defense of our patients

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We read with interest and dismay the article 'Public health urgency created by the success of mechanical thrombectomy studies in stroke' recently published in *Circulation*.¹ There is now overwhelming, class 1, level A evidence supporting mechanical thrombectomy (MT) as the standard of care for eligible patients with acute stroke secondary to an emergent large vessel occlusion (ELVO). We agree that attention must be focused on how to translate this evidence into better outcomes for more patients. However, the opinions expressed by Drs Hopkins and Holmes lead to unwarranted conclusions that have dangerous implications for patient care. Their article reflects (1) a disregard for training, expertise, and experience in the management of a disease that may lead to death or disability when treating physicians do not have them; (2) a misunderstanding of the fundamental underpinnings of stroke physiology and anatomy; and (3) a false association between a real problem (undeveloped systems of care) and a spurious assumption (ie, that there are not enough physicians trained to perform intracranial MT). We examine these concerns below.

The primary issue is one of training. The field of neurointervention is shared by physicians with different specialty backgrounds who have completed rigorous

fellowship training in neurointerventional surgery. Neurointerventionalists are uniquely open to the inclusion of a broad spectrum of physicians from specialty backgrounds. However, regardless of residency training, each neurointerventionalist undergoes an additional 1–2 years of dedicated fellowship training. Neurointerventional fellowship training focuses on the development of technical catheter skills, and also includes the interpretation of multimodality neuroimaging, advanced clinical decision-making, and extensive complication management training.

Intracranial endovascular procedures have a great potential for precipitous iatrogenic morbidity and mortality. Proper neurointerventional training, employing a broad array of skills, is essential when dealing with intraprocedural complications. As an example, if vessel perforation occurs during MT, the operator must be immediately capable of managing the severe intracranial bleeding and life-threatening elevation in intracranial pressure that typically occur within minutes. For patient safety, worldwide training standards have evolved that ensure completion of the proper number of intracranial interventional procedures (including stroke intervention, aneurysm treatment, arteriovenous malformation embolization, and others) to establish a basic level of competency to perform neurointerventions, including MT.²

In the USA, physician training in neurointerventional and MT techniques is well delineated. The Accreditation Council for Graduate Medical Education (ACGME), the Society of NeuroInterventional Surgery (SNIS), the Cerebrovascular Section of the American Association of Neurological Surgeons (AANS) and Congress of Neurological Surgeons (CNS), and the American College of Radiology (ACR) have published guidelines specifying the number of diagnostic and interventional procedures required for adequate training.^{3,4} Cardiologists should perform stroke

interventions only if they have completed a fellowship in neurointerventional surgery that meets these established guidelines. Drs Holmes and Hopkins' assertion that interventional cardiologists are inherently qualified to treat intracranial disease is akin to reasoning that a hepatic surgeon should be allowed to perform cardiac surgery because the procedures employ similar skills. Both types of physicians may be well trained in their respective specialties, but neither would ever endeavor to perform the other's surgery.

The Hopkins and Holmes article also misrepresents the epidemiology of stroke. Although 800 000 strokes occur annually in the USA, only a limited number are eligible for interventional stroke therapy. Estimates vary, but the best data suggest that only 10–15% these patients (80 000–120 000) are eligible for MT.^{5,6} For this number of stroke interventions, there are indeed more than adequate numbers of neurointerventionalists in the USA, and many more are being trained.⁷

Time is critically important for this group of patients, and 85% of the US population live within 60 min of an endovascular-capable center that is continuously staffed by trained neurointerventionalists.⁸ Thus the problem is not an adequate supply of physicians or centers capable of performing thrombectomy, but rather the identification and appropriate triage of patients with a stroke to thrombectomy-capable centers. Unfortunately, in the USA most patients with a stroke are still taken to the nearest hospital rather than the most appropriate facility. Such limitations have already been addressed for trauma and cardiac diseases. The past three decades have witnessed the development of triage systems designed to direct the transport of patients to appropriate centers. Similar efforts are underway in the management of patients with a stroke. At present, the major obstacle to patients receiving interventional stroke therapy is one of *transporting the patients to the correct center* as quickly as possible, not one of *physician shortage*.^{9,10}

The assertion that significant numbers of patients with a stroke secondary to ELVO in the USA are untreated owing to a shortage of physicians or thrombectomy centers is false. Only patients living in the most sparsely populated and remote regions of the USA lack timely access to MT—that is, those patients who live in rural areas that are much more than 1 hour away from an established endovascular-capable center. Unfortunately, such areas do not produce a sufficient case volume to maintain physician proficiency in treating stroke or

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justify the economic burden associated with maintaining an endovascular-capable facility. Moreover, it is unlikely that cardiologists practicing in these rural communities would be interested in expanding their experience to include the treatment of stroke. The available data provide no evidence that there is a 'cataclysmic gap between patient need and available expertise' as Drs Hopkins and Holmes assert. The true gap is in the prehospital and intrahospital identification of patients with a stroke secondary to ELVO and efficient transport of these patients to centers capable of performing thrombectomy.

We therefore urge caution when considering how best to implement care for patients with ELVO and recommend that healthcare professionals, governments, emergency medical systems, and hospitals focus on developing robust systems of care for stroke. We certainly agree with the need to organize multidisciplinary stroke teams, but all team members must be appropriately and rigorously trained. We must ensure that physicians performing interventions for acute stroke have the cognitive and technical skills to achieve

both safety and good outcomes. Our patients deserve this assurance.

Correction notice In the April issue, the caption for the cover image was incorrect. It should read: Vortex analysis of an unstable basilar tip aneurysm from the article by Brinjikji W *et al.*

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