

# Interventional Radiologists and Stroke

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# Interventional Radiologists and Stroke: Responding to Neurointerventional Concerns

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Society of Interventional Radiology (SIR)/Cardiovascular and Interventional Radiological Society of Europe (CIRSE)/Interventional Radiology Society of Australasia (IRSA) recently published a joint position statement supporting the role of interventional radiologists in acute ischemic stroke interventions (1). The goal of this statement is to allow successful stroke endovascular thrombectomy (EVT) to be accessible to as many patients as possible. Interventional radiologists are not seeking to compete with neurointerventionists in the care of acute stroke patients. Rather, they are working with their neurointerventionist colleagues to meet a public health need.

The joint statement of multiple international neurointerventional societies (2) raises 2 main concerns against the role of interventional radiologists in EVT.

1. One concern is that EVT, often referred to as mechanical thrombectomy, requires complex processes and resources; EVT proceduralists' post-training performance must meet satisfactory benchmarks; and EVT centers' outcomes must be acceptable. We agree completely, and this concern is fully in line with the SIR/CIRSE/IRSA joint position statement.

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Consistent training does not mean that EVT training for interventional radiologists must be identical to full neurointerventionist training. Tailored training for EVT, without the full spectrum of neurointerventionist training, is consistent with the European Board of Neurointervention Standards of Training for Acute Ischemic Stroke Interventions (3), as well as with the European Society for Minimally Invasive Neurological Therapy's "separate course dedicated to those physicians who want to perform stroke treatment only"(4).

The neurointerventional statement disagrees that there is evidence that training short of a neurointerventionist fellowship leads to acceptable outcomes. The concern is that the published interventional radiology results are below standard and not current, and the results from the MR CLEAN trial (5) (with majority interventional radiologists) are also below standard. However, comparing outcomes of trials with significantly different trial populations is scientifically unsound. If the "standard" is set by the large randomized controlled trials, one should consider that these trials used much stricter inclusion criteria than MR CLEAN. The MR CLEAN trial had the same odds ratio of benefit from EVT as the 7 other randomized controlled trials (6), confirming that the procedures were performed with equal expertise. The Czech Republic registry results (7) are both current and similar to neurointerventionist results. But even if the skills of neurointerventionists to perform EVT are better developed than those of well-trained interventional radiologists, when there is a need for more EVT interventionists, and neurointerventionists are not able to address this need, then any adequately trained physician who wants to perform EVT should be welcomed.

2. The second concern denies that large numbers of patients miss out on treatment or that there is a need for more EVT-capable hospitals. The neurointerventional statement says that the estimate that EVT eligible patients occur in 31/100,000 population (8) is too high, because the estimate is based on non-genuinely eligible patients. Rai et al's (8) estimate was based on anatomic clot location (M-1 and M-2) and not clinical indications. A recent article stated that the incidence of large vessel occlusion in all ischemic strokes is about 30% (9). In Europe, a large survey has been performed to assess the availability of stroke care, including

EVT, in European countries (10), showing that in 42 European countries, on average 1.9% of patients with incident ischemic stroke receive EVT (3.7/100,000), with a wide variation between countries. In the United Kingdom, it is estimated that 10% of all stroke admissions are eligible for EVT (11), but currently only 0.5% receive it (10). The authors calculated that with a (conservative) estimate of 5% of stroke patients being eligible for EVT, 67,347 more patients should receive EVT in Europe. The most common reason reported for not providing EVT to all eligible patients was lack of specifically trained personnel (10). There is no doubt that currently in parts of the world many patients miss out on EVT treatment.

The assertion that it would be easy to perform more cases in current full-spectrum neurointerventionist centers is contradicted by recent articles that describe the work burden from the increased number of stroke cases (12) and the resulting prevalence of burnout (13). The inability of neurointerventionists to provide adequate EVT coverage in Australia led to a coroner's inquest after patient deaths (14). In current centralized comprehensive and thrombectomy-capable stroke centers in the United States, at least 25% of these centers rely on interventional radiologists to perform EVT (SIR, unpublished data, 2019). Even if full-spectrum neurointerventionist centers would be capable of treating all eligible EVT patients, transferring these patients to distant neurointerventionist centers potentially delays care, which has been shown to be associated with poorer revascularization (15) and clinical outcomes (16). DAWN and DEFUSE 3 (17,18) showed that some delayed patients could still benefit, but they did not refute the risk from delay of treatment. The assertion that there are virtually no regional centers in developed countries more than 2 hours away by air from a thrombectomy center assumes that air transport is available 24/7 with no delays. This is not a realistic assumption for any acute care transport capability.

The multi-society international standards of practice in acute ischemic stroke interventions (19) define a "level 2" stroke center as a center performing EVT but no other neurointerventions. A full-spectrum neurointerventional fellowship is not a requirement for an interventional physician. Primary stroke centers could refer their EVT-eligible patients to a level 2 center if transfer to a level 1 (full neurointervention) center would lead to a delay of more than 2 hours. All these societies (Asian-Australian Federation of Interventional and Therapeutic Neuroradiology, Australian and New Zealand Society of Neuroradiology, American Society of Neuroradiology, Canadian Society of Neuroradiology, European Society of Minimally Invasive Neurological Therapy, European Society of Neuroradiology, European Stroke Organization, Japanese Society for NeuroEndovascular Therapy, The French Society of Neuroradiology, Ibero-Latin American Society of Diagnostic and Therapeutic Neuroradiology, Society of NeuroInterventional Surgery, Society of Vascular and Interventional Neurology, World Stroke Organization, and World Federation of

Interventional Neuroradiology) recognize the need for such level 2 stroke centers in specific regions.

The interventional radiology societies agree that acceptable EVT results require adequate and consistent training. Therefore, training for EVT (courses, training centers, and quality requirements) can benefit from collaboration with the neurointerventionist societies. The recently revised SIR training guidelines are in press and include requirements for cognitive and technical training, including selective arteriography, cerebral arteriography, microcatheter experience, carotid revascularization, EVT experience, and neuroimaging. The SIR guidelines have both in the past and with the most recent revision included authors with backgrounds including dual fellowship-trained interventional radiology/neurointervention, interventional radiology, stroke neurology, and endovascular neurosurgery, to achieve a balanced approach to reasonable training standards. The neurointerventional statement suggests that interventional radiology is not capable of creating meaningful training guidelines because interventional radiologists lack the expertise to know what they don't know. Neurologists, neurosurgeons, or even interventional radiologists can claim the same about neurointervention training if only neurointerventionists are involved. Stroke requires, just as neurointervention, a multidisciplinary approach. Interventional radiology societies are willing and interested in being part of this approach.

In summary, the data are clear that EVT for stroke is a powerful therapy to reduce death and disability. There is strong evidence that more patients should be treated with EVT, and more EVT-trained physicians and probably more EVT centers are needed. By working with our neurointerventionist colleagues at local, regional, and national levels, interventional radiologists are currently adding, and can continue to add, to the trained workforce and are providing acceptable outcomes for stroke patients requiring EVT.

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