LETTER TO THE EDITOR

Impact of Quality Standards on Stroke Management and Outcome Requires Appropriately Designed Studies

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We read with interest Panda et al's article on a prospective observational study of stroke quality metrics in 200 consecutive patients admitted for ischemic stroke (IS) and 56 patients were admitted for intracerebral hemorrhage (ICH).[1] The AHA/ASA get with the guidelines (GWTG) concept was used.[1] The conformity of performance metrics ranged from 69% for the use of deep venous thrombosis prophylaxis to 98% for the use of statins in IS patients.[1] The in-hospital and 28th-day post-discharge mortality was higher in ICH than in IS patients.[1] Optimal adherence to thrombolysis guidelines, acute hospital interventions, and discharge interventions was associated with reduced 28th-day and post-discharge mortality in IS and ICH patients.[1] It was concluded that adherence to quality metrics and performance measures is associated with low mortality and favorable clinical outcome.[1] The study is impressive, but several points require discussion.

The major limitation of the study is that the outcome of IS and ICH patients may depend not only on adherence to performance quality standards but much more on the nature of the standards as well as the equipment and facilities available at the treatment unit. If the standard does not include thrombectomy for the treatment of IS, those who have an indication for thrombectomy but no available facilities will inherently have a worse outcome than those who undergo thrombectomy. If only CT but no MRI imaging is available, the mismatch concept may not be applied and may lead to indications for thrombolysis where none exists.

A second limitation of the study is that patients with IS and those with ICH were mixed. The treatment of both is completely different, so applying relevant quality measures may not be ideal for both cohorts. There is no need to measure DIT or DNT in ICH patients because they usually will not undergo thrombolysis or thrombectomy. The outcome of ICH depends largely on the size of the bleeding, the extent of perifocal edema, whether or not there is intraventricular intrusion, and whether conservative or surgical treatment is applied.

A third limitation is that ICH patients were not evaluated to determine whether ICH was primary or secondary to IS or venous sinus thrombosis (VST). Since the outcome of ICH depends heavily on this classification, we should know how many patients had primary and how many had secondary ICH.

A fourth limitation is that the risk factor carotid artery stenosis (CAS) was not included in the analysis. Since approximately 10% of IS is due to CAS or occlusion, it is imperative to include this parameter in the analysis and to perform carotid ultrasound examination within 24 h of admission. Patients who undergo thromboendarterectomy (TEA) or carotid artery stenting within 2 weeks of IS are known to have better long-term outcomes than those who do not undergo TEA or stenting.

A fifth limitation is that the number of patients who received anticoagulation before IS or ICH was not included in the analysis. How many of the patients with prehospital anticoagulation arrived with therapeutic anticoagulation and were therefore excluded from thrombolysis? How many took factor-Xa antagonists or thrombin antagonists (DOACs) and how many vitamin-K antagonists (VKAs)? In how many was the INR or the anti-factor-Xa activity in the therapeutic range? How many with therapeutic anticoagulation were antagonized to perform thrombolysis after normalization of coagulation parameters?

A sixth limitation is that the number of patients who did not meet AHA/ASA quality standards, and therefore, did not undergo thrombolysis was not reported. In terms of study design, it would have made more sense to compare only IS patients who met quality standards with those who did not.

A seventh limitation is that stroke location and stroke volume were not included in the analysis. Since these parameters can strongly influence the severity of the stroke and thus the outcome, these parameters should be included in the analysis. A brainstem stroke can have a different outcome compared with a middle cerebral artery stroke. The stroke mechanism was also not differentiated. How many had microangiopathy, macroangiopathy, embolism, heart failure, coagulopathy, or polycythemia?

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In summary, the excellent review has limitations that should be addressed before drawing final conclusions. Clarifying the weaknesses would strengthen the conclusions and could improve the study. To analyze the impact of quality standards for the management and outcome of IS, an appropriate design and the inclusion of all factors affecting the outcome must be applied.

Availability of Data and Material

All data are available from the corresponding author.

Author Contribution

JF was responsible for the design and conception, discussed the available data with coauthors, wrote the first draft, and gave final approval. SM contributed to literature search, discussion, correction, and final approval.

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