

# A Systematic Review and Critical Appraisal of Quality Measures for the Emergency Care of Acute Ischemic Stroke

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Acute stroke is an important focus of quality improvement efforts. There are many organizations involved in quality measurement for acute stroke, and a complex landscape of quality measures exists. Our objective is to describe and evaluate existing US quality measures for the emergency care of acute ischemic stroke patients in the emergency department (ED) setting. We performed a systematic review of the literature to identify the existing quality measures for the emergency care of acute ischemic stroke. We then convened a panel of experts to appraise how well the measures satisfy the American College of Cardiology/American Heart Association (ACC/AHA) criteria for performance measure development (strength of the underlying evidence, clinical importance, magnitude of the relationship between performance and outcome, and cost-effectiveness). We identified 7 quality measures relevant to the emergency care of acute ischemic stroke that fall into 4 main categories: brain imaging, thrombolytic administration, dysphagia screening, and mortality. Three of the 7 measures met all 4 of the ACC/AHA evaluation criteria: brain imaging within 24 hours, thrombolytic therapy within 3 hours of symptom onset, and thrombolytic therapy within 60 minutes of hospital arrival. Measures not satisfying all evaluation criteria were brain imaging report within 45 minutes, consideration for thrombolytic therapy, dysphagia screening, and mortality rate. There remains room for improvement in the development and use of measures that reflect high-quality emergency care of acute ischemic stroke patients in the United States. [Ann Emerg Med. 2014;64:235-244.]

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### INTRODUCTION

There is increasing interest in quality, costs, and accountability in our health care systems,<sup>1,2</sup> and quality measurement efforts have developed rapidly during the last decade.<sup>3,4</sup> By measuring and reporting on quality of care and patient outcomes, quality measurement programs aim to improve patient outcomes and increase accountability. Effective quality measurement programs direct a system-based approach for translating effective processes of care to improve quality, enable identification of high and low performers, and allow providers to learn from one another.<sup>5</sup> Measures of quality and performance will continue to increase in importance as health care systems transition from the fee-for-service model to models based on pay for performance and value-based purchasing. These measures also are used for quality improvement and public reporting.<sup>6</sup>

Stroke is the seventh most common reason for emergency department (ED) admissions, and a leading cause of severe disability.<sup>7,8</sup> Effective acute treatment reduces disability and increases the likelihood of favorable clinical outcomes.<sup>9-15</sup> Given the burden of illness caused by stroke and the degree to which emergency care affects patient outcomes, ensuring consistent, high-quality emergency stroke care is important. Performance

measurement is being used increasingly to assess the quality of care delivered. Several organizations have developed stroke quality measures for use in both inpatient and outpatient settings.<sup>16</sup>

It is important that quality measures accurately reflect research evidence and clinical performance because data on quality measures are increasingly used for public reporting, physician accountability, and health care reimbursement. Clinical guidelines are developed with the intention of informing physician judgment, and often include recommendations with various degrees of scientific confidence.<sup>5</sup> In contrast, quality measures serve as universally applied standards and are intended to directly assess the quality of care provided.<sup>17</sup> Measures should appropriately capture the intended quality construct, should be reliable and valid, and should have minimal unintended consequences for both patients and health care systems. Recognizing this challenge, the joint American College of Cardiology (ACC) and American Heart Association (AHA) Task Force on Performance Measures created criteria for the development of measures in cardiovascular care.<sup>5</sup> These criteria have been used to evaluate measures of various emergency conditions (cardiac and noncardiac),<sup>18</sup> but have not been applied to the measures for the emergency care of acute ischemic stroke.

Our objective was to identify, summarize, and evaluate existing quality measures for the emergency care of acute ischemic stroke. Our motivation was to translate knowledge

about the quality measures in the United States into evidence for clinicians, practicing emergency physicians, policymakers, and the public. We chose to focus on US measures because we seek to inform ongoing US policy and payer discussions on selection of quality measures for emergency care of acute ischemic stroke. We performed a systematic review of the literature and relevant quality programs to identify quality measures for the emergency care of acute ischemic stroke. We then convened an expert panel to evaluate the quality measures. In this article, we describe the current measures, and we appraise how well the measures satisfy the ACC/AHA evaluation criteria.

## MATERIALS AND METHODS

We use the American Stroke Association definition of ischemic stroke as an episode of neurologic dysfunction caused by focal cerebral, spinal, or retinal infarction.<sup>19</sup> Our prespecified search protocol was developed in collaboration with a medical research librarian. We first searched the medical literature, using PubMed for relevant articles published after 2000, given the launch of the Centers for Medicare & Medicaid Services quality initiatives in 2001.<sup>4</sup> [Appendix E1](#) (available online at <http://www.annemergmed.com>) contains the detailed search strategy including the literature search terms. The articles were screened for those describing measures related to the ED-based emergency care of acute ischemic stroke patients at unselected acute care hospitals on a national level in the United States. We excluded articles not related to acute stroke quality measurement in adults, including articles describing guidelines and evidence-based components of stroke care that do not exist as quality measures. If there was any question of the applicability of the measure to ED care (for example, dysphagia screening, which may occur in the ED or on an inpatient basis), we erred on the side of inclusion. We also excluded programs or measures relating to specific regions or single centers and those existing solely outside of the United States because our aim was to describe quality measures that applied to all acute care hospitals in the United States. Two authors (J.F.B., K.S.) screened all titles and abstracts independently for potential relevance and then conducted independent full-text review to determine eligibility. The authors then met to resolve any disagreements. For each of the relevant articles identified, we then screened the references and checked related citations in PubMed, as well as the Scopus and Web of Science databases.

We also performed Google searches of the Web sites for programs involved in stroke quality improvement to identify non-peer-reviewed (gray) literature. These programs were chosen according to a previous comprehensive review<sup>16</sup> and an updated Web search and included Centers for Medicare & Medicaid Services programs Outpatient Quality Reporting, Inpatient Quality Reporting, Physician Quality Reporting System; the National Quality Forum; The Joint Commission (TJC); American Medical Association–Physician Consortium on Performance Improvement; and American Stroke Association–Get With the Guidelines. [Appendix E1](#) (available online at <http://www.annemergmed.com>) contains the detailed search strategy, and

more information on these programs is shown in [Appendix E2](#) (available online at <http://www.annemergmed.com>).

After relevant references from the peer-reviewed medical literature and gray literature were identified, we extracted measure details, including name, endorsing program, measure description, numerator/denominator definitions, target population to whom the measure is applied, inclusion/exclusion criteria, participants in reporting (whether measure is applied to all US hospitals or a particular subset), consequences of reporting (such as financial penalties and public reporting), date developed, and date and nature of last revision.

For the second stage of the review, we used the ACC/AHA evaluation framework to appraise the current measures.<sup>5</sup> The 4 ACC/AHA criteria are (1) the strength of the evidence supporting the measure (ie, multiple efficacy and effectiveness studies consistently demonstrate meaningful benefit on patient outcomes); (2) the clinical relevance of the outcome associated with adherence to the measure (ie, that the outcomes are meaningful to patients and society); (3) the magnitude of the relationship between performance and outcome (ie, that significant improvements in patients' health will be realized with greater adherence); and (4) the cost-effectiveness of the quality improvement intervention (ie, consideration of cost-effectiveness of the process being measured).

The expert panel consisted of a convenience group of 5 individuals from emergency medicine, stroke neurology, internal medicine, stroke epidemiology, and stroke quality improvement in the region, all of whom are involved in clinical or health services stroke research. One member of the panel has served in guideline development and as a member of the National Quality Forum Neurology measures group (W.G.B.), and another member has been involved in national stroke quality improvement efforts through the AHA, including Get With the Guidelines–Stroke (M.J.R.). None of the panel members had relationships with industry relevant to the topic of stroke or tissue plasminogen activator (tPA). Significant relationships are further detailed in [Appendix E3](#) (available online at <http://www.annemergmed.com>).

The expert panel had 1 face-to-face meeting during an afternoon and used a modified Delphi approach<sup>20</sup> to evaluate whether each measure met each of the 4 ACC/AHA criteria. The possible response categories were met, not met, or indeterminate for each criterion. This process involved initial voting, followed by discussion and further voting until consensus was reached. Some votes did change after review of background studies and discussion within the group. In assessing the strength of the evidence supporting a measure, we prioritized randomized, double-blind, placebo-controlled trials or meta-analyses of such trials, as highest quality data (assigned ++ in the evaluation). Large prospective cohort studies were also included to supplement randomized, double-blind, placebo-controlled trial results (assigned + in the evaluation).

Before the face-to-face meeting, investigators (K.S. and J.F.B.) prepared the necessary background materials for the evaluation process. These materials included articles, the most recent AHA/

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