Presenting Symptoms and Dysphagia Screen Predict Outcome in Mild and Rapidly Improving Acute Ischemic Stroke Patients

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Objective: There are limited data on which patients not treated with intravenous (IV) tissue-type plasminogen activator (tPA) due to mild and rapidly improving stroke symptoms (MaRISS) have unfavorable outcomes. *Materials and Methods:* Acute ischemic stroke (AIS) patients not treated with IV tPA due to MaRISS from January 1, 2009 to December 31, 2013 were identified as part of the Georgia Coverdell Acute Stroke Registry. Multivariable regression analysis was used to identify factors associated with a lower likelihood of favorable outcome, defined as discharge to home. *Results:* There were 1614 AIS patients who did not receive IV tPA due to MaRISS (median National Institutes of Health stroke scale [NIHSS] 1], of which 305 (19%) did not have a favorable outcome. Factors associated with lower likelihood of favorable outcome included Medicare insurance status (odds ratio [OR]: .53, 95% confidence interval [CI]: .34-.84), arrival by emergency medical services (OR: .46, 95% CI: .29-.73), increasing NIHSS score (per unit OR: .89, 95% CI: .84-.93), weakness as the presenting symptom (OR: .50, 95% CI: .30-.84), and a failed dysphagia screen (OR: .43, 95% CI: .23-.80). During the study period, <1% of patients presenting to participating hospitals with MaRISS within the eligible time window received IV tPA. *Conclusions:* Baseline characteristics, presenting symptoms, and response to dysphagia screen identify a subgroup of patients who are more likely to have an unfavorable outcome. Whether IV tPA treatment can improve the outcome in this subgroup of patients needs to be evaluated in a randomized placebo-controlled trial. **Key Words:** Minor stroke—Thrombolysis—MaRISS—Acute stroke treatment—Dysphagia screen.

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Received April 19, 2016; revision received July 20, 2016; accepted July 30, 2016.

Funding source: The Georgia Coverdell Acute Stroke Registry (GCASR) has been funded by the Centers for Disease Control and Prevention under Agreement #U58DP003960.

Disclosures: Deborah Camp: Genentech Speakers Bureau. Kerrin Connelly: Clinical specialist, Genentech.

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1052-3057/$ - see front matter

http://dx.doi.org/10.1016/j.jstrokecerebrovasdis.2016.07.049

Introduction

Intravenous (IV) tissue-type plasminogen activator (tPA) treatment remains the standard of care for eligible ischemic stroke patients presenting within 4.5 hours from the last time seen normal.[1] Although studies have shown reduced disability from acute ischemic stroke (AIS) in patients who received IV tPA,[2-10] including those described as having minor stroke as defined by the National Institutes of Health stroke scale (NIHSS) ≤5,[11] a study of patients in the Get With The Guidelines–Stroke registry showed that 31.2% of patients presenting with AIS within the acceptable time (4.5 hours) did not receive IV tPA due to mild and rapidly improving stroke symptoms (MaRISS).[12] Although there is no specific criteria defining MaRISS, most of these patients presented with an NIHSS score ≤5.[13] Studies of other healthcare systems have shown similar results ranging from 29% to 43% of eligible patients not receiving IV thrombolysis due to mild stroke and clinical improvement.[14-17] Although a majority of physicians agree on defining MaRISS as symptoms improving to a mild stroke with residual deficits that are regarded as nondisabling,[18] this definition leaves the diagnosis vulnerable to differences in clinical interpretation.

Although most patients presenting with MaRISS who are untreated do well, various studies show anywhere from 23% to 38% of them do not have favorable outcomes, including development of disabling neurologic symptoms, ultimate discharge to hospice, skilled nursing facilities, acute rehabilitation, or death.[12,14,19-23] Some have suggested there may be specific patient criteria associated with which untreated MaRISS patients have unfavorable outcomes; however there are limited data, and none using dysphagia screening tools or specific to the "Stroke Belt" region.[19,21-24] Thus, the objective of our study was to identify whether baseline characteristics, presenting symptoms, and response to an initial dysphagia screening test are associated with which patients not treated with IV tPA due to MaRISS go on to have an unfavorable outcome, especially in our unique patient population.

Methods

Data from hospitals participating in the Georgia Coverdell Acute Stroke Registry (GCASR), a program aimed at improving the care of acute stroke patients in the hospital and prehospital settings funded by the Centers for Disease Control Paul S. Coverdell National Acute Stroke Registry cooperative agreement, were utilized for this analysis; the GCASR data collection process has been described previously.[25] All patients presenting with AIS symptoms between January 1, 2009 and December 31, 2013 were eligible for this analysis if they met the following inclusion criteria: 18 years of age or older, clinical diagnosis of ischemic stroke, and no IV tPA administered solely due to rapidly improving or mild severity of stroke symptoms. Patients were excluded for the following reasons: other documented reason for not administering IV tPA, previous history of stroke, residing in a nursing home prior to hospitalization or place of occurrence not documented, inability to ambulate independently with or without device on admission, and all patients from hospitals with less than five total stroke patient records.

We obtained the following data from GCASR participating hospitals through concurrent and retrospective medical chart review: baseline characteristics including age, sex, race, and smoking status; medical history including hypertension, dyslipidemia, diabetes mellitus, heart failure or coronary artery disease including myocardial infarction, and atrial fibrillation or flutter; use of lipid lowering drugs or antihypertensive therapy; hospital-related characteristics including primary stroke center status, urban location, bed size, source of insurance, mode of patient transport, and time first received by emergency department (ED) (minutes); patient presentation including last known well to ED arrival (minutes), NIHSS score, presence of neurologic symptoms including aphasia, weakness, altered level of consciousness, or other neurologic signs, presence of atrial fibrillation or flutter during hospitalization, and response to dysphagia screening test. Our study endpoints included favorable outcome defined as being discharged to home. We also evaluated favorable outcome in terms of ability to ambulate independently at the time of discharge, with or without an aiding device.

Statistical Analysis

We analyzed patient and hospital-related characteristics and the outcome variables descriptively. We classified hospitals by bed size into medium-small (<250 beds), medium-large (250-399 beds), and large (≥400 beds). The 2010 Rural-Urban Commuting Area primary codes were used to classify hospitals geographically into metropolitan (codes 1-3) and nonmetropolitan (codes >3).[26] We compared differences between those included and excluded from the multivariable analyses using chi-square test for categorical variables and Wilcoxon nonparametric test for continuous variables. After assessing for multicollinearity between predictor variables, we analyzed the outcome variables, discharge to home, and ambulatory status at discharge, using generalized estimating equations controlling for in-hospital correlation. Sociodemographic and clinical characteristics and hospital features including bed size and urban setting were covariates in the multivariable analyses. Results are presented indicating the likelihood of favorable outcomes. All analyses were performed using SAS for Windows (version 9.3, SAS Institute, Inc, Cary, North Carolina).