Weekend Discharge and Stroke Quality of Care: Get With The Guidelines-Stroke Data from a Comprehensive Stroke Center

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Objective: Get With The Guidelines-Stroke collects data on hospital compliance with evidence-based stroke quality of care indicators. Prior work has investigated a link between weekend hospital admission and increased mortality after stroke. There is, however, a paucity of work investigating a similar association between weekend hospital discharge and quality of care. We aimed to determine if weekend discharge affects care to enlighten opportunities for quality improvement. *Materials and Methods:* Through a retrospective analysis of records from a Comprehensive Stroke Center from July 2010 to June 2015, we identified patients with ischemic stroke, subarachnoid hemorrhage, and intracerebral hemorrhage. Our quality of care indicators were dysphagia screening, rehabilitation assessment, smoking cessation counseling, stroke education, and weight reduction counseling. We created regression models to find adjusted differences in quality of care measure compliance for patients discharged on the weekend. *Results:* Our analysis included 2737 patients, of which 431 were discharged on the weekend. After adjustment, weekend discharge was significantly associated with reduced stroke education (odds ratio .67, confidence interval .51-0.88, $P = .004$) and reduced weight reduction counseling (odds ratio .65, confidence interval .45-0.93, $P = .018$). *Conclusions:* Hospital discharge on the weekend was associated with an adjusted one-third decrease in odds of stroke education and weight reduction counseling. There is an opportunity for quality improvement in educating stroke patients before hospital discharge on the weekend. **Key Words:** Stroke—quality improvement—database—health education.

Introduction

There is a significant amount of literature associating weekend hospital admission with poorer outcomes for a variety of medical circumstances, ranging from urgent pediatric surgeries to traumatic brain injury in older adults.[1-8] The same phenomenon has been observed for ischemic stroke, subarachnoid hemorrhage (SAH), and intracerebral hemorrhage (ICH).[9-14] Despite intentions to provide necessary medical therapies, limited personnel and hospital resources during intervals with reduced staffing can inhibit or delay care delivery.

Crucial hospital functions with reduced staffing on weekends are not limited to emergency services. Accordingly, some studies have questioned whether other processes on weekends, chiefly the hospital discharge process, are associated with worse outcomes.[15] Hospital discharge can be complicated and require significant coordination of care. This is especially true for stroke patients, as hospitals are tasked with adhering to a host of evidence-based stroke quality of care measures before hospital discharge.[16] Many of these measures depend on physicians or physician extenders, but they also require collaboration with multiple allied health professionals and hospital systems as a whole. This complex discharge process makes the quality of care

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measures potentially vulnerable to the effects of reduced staffing. We thus hypothesized that stroke quality of care measure compliance would be reduced for patients discharged from a Comprehensive Stroke Center on the weekend. Our aim was to enlighten potential opportunities for quality improvement.

Materials and Methods

Get With The Guidelines (GWTG)-Stroke is a national, prospective database that receives entries from participating hospitals and evaluates performance on stroke quality of care measures.[17] Trained hospital personnel are responsible for data entry via an Internet-based Patient Management Tool with standardized definitions and coding instructions. The system performs checks for completeness and internal consistency, making the quality of data high.[18,19]

Institutional Review Board approval was obtained for retrospective analysis of the GWTG data submitted by a single Comprehensive Stroke Center from July 2010 to June 2015. The study identified patients who suffered an ischemic stroke, SAH, or ICH. Variables included were demographics, medical comorbidities, method of patient arrival, stroke type, care by a neurologist, hospital discharge destination, length of stay, day of discharge, and quality of care measure compliance data. Weekend discharge was defined as any discharge between 00:00 on Saturday and 23:59 on Sunday. After hours discharge, 17:01-06:59 Monday through Friday, was not included due to the infrequency of discharge during these times and intrinsic staffing dissimilarities compared to the weekend.

Initially 3680 admissions were available from the database during the study period. We excluded all patients without ischemic stroke, SAH, or ICH, as well as all patients designated as comfort care measures only. Our final study population included 2737 admissions (Fig 1).

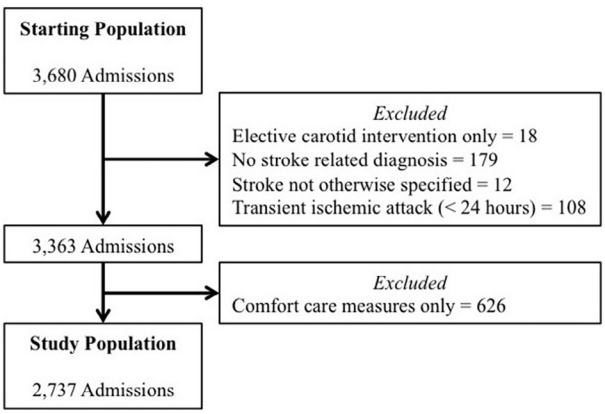

Figure 1. *Flowchart depicting the number of patients excluded due to each criterion.*

Study Measures

Stroke quality of care measures can span from prehospital to post-discharge care. For this study focusing on quality of care as related to hospital staffing at discharge, we chose the following applicable quality of care measures: dysphagia screening before oral intake; rehabilitation assessment by physical, occupational, or speech therapy; smoking cessation counseling for smokers; stroke education regarding risk factors, warning signs and symptoms, emergency medical services activation, medications, and follow-up; and for overweight patients, defined as a body mass index >25, education regarding weight reduction, increasing activity, and diet counseling. Patients with contraindications or missing values for specific measures were removed from analysis of those measures.

Statistical Analyses

All GWTG variable coding was maintained, except for the consolidation of these variables: "Private/Other" insurance included all patients recorded as having either private, Department of Veterans Affairs, Civilian Health and Medical Program of the Uniformed Services, or other uncategorized insurance; "Private Transport" for patient arrival method included all patients documented as arriving by private transport, taxi, other from home/scene, not documented, unknown, or missing; "Neurologist Care" was defined as neurology admission or a neurology consult during the hospital stay.[20] Missing values were not imputed.

Patients discharged during the week were compared to those discharged on the weekend using univariate statistics. Categorical variables were evaluated with Pearson chi-square tests, and continuous variables were compared using parametric or nonparametric tests as appropriate. To obtain adjusted odds ratios (ORs) for quality measure compliance, logistic regression models for each quality of care measure using all covariates were generated. These models were pruned with bootstrapped resampling validation (b = 300) and backward step-down variable deletion using Akaike's information criterion.[21] P values <.05 were used for significance testing. R 3.1.2 (R Foundation for Statistical Computing, Vienna, Austria) was used for all statistical analyses.[22]

Results

A total of 2737 stroke admissions were identified, with 2306 discharged from the hospital during the week and 431 discharged on the weekend. Complete patient comparisons between discharge day groups are provided in Table 1. Overall, patients discharged on the weekend were more likely to be older, have histories of prior stroke or transient ischemic attack (TIA), be discharged to home instead of a skilled nursing facility, and have shorter lengths of stay.