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Inpatient Rehabilitation Centers and Concern for Increasing Volume of Ischemic Stroke Patients Requiring Rehabilitation

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Abstract

Objectives—To determine whether prolonged length of stay (pLOS) in ischemic stroke is related to delays in discharge disposition arrangement.

Methods—We designed a retrospective study to compare patients with acute ischemic stroke (AIS) who experienced pLOS to those who did not experience pLOS. Patients who have had AIS between July 2008 and December 2010 were included unless they arrived >48 hours after time last seen normal, had an unknown last seen normal, or experienced an in-hospital stroke. pLOS was defined in our prospective stroke registry (before the generation of this research question) as hospitalization extended for 24 hours more than necessary to determine neurologic stability and next level of care/disposition for a given patient. We characterized the frequency of each cause of pLOS and further investigated the destinations that were more frequently associated with pLOS among patients with delay resulting from arranging discharge disposition.

Results—Of the 274 patients included, 106 (31.9%) had pLOS. Reasons for pLOS were discharge disposition (48.1%), non-neurologic medical complications (36.8%), delays in imaging studies (20.8%), awaiting procedure (10.4%), and neurologic complications (9.4%). Among patients with pLOS caused by delayed disposition, more than half were awaiting placement in an inpatient rehabilitation facility.

Conclusions—For the majority of our patients, pLOS was caused by acquired medical complications and delayed disposition, most commonly inpatient rehabilitation. Further efforts are needed to prevent complications and further investigation is necessary to identify the factors that may contribute to delayed discharge to inpatient rehabilitation facilities, which may include delayed planning or heightened scrutiny of insurance companies regarding their beneficiaries.

Keywords

stroke; inpatient rehabilitation; length of stay; complications; discharge disposition

Advances in treatment of acute stroke and inpatient management have successfully lowered the stroke mortality rate.¹ In addition, these advances have resulted in improved outcomes for patients with ischemic stroke.² Although a decline in stroke incidence has been demonstrated,³ the actual number of strokes each year is increasing because more people are

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living longer. Advances in stroke and neurocritical care may result in an increase in the number of ischemic stroke survivors who would benefit from intensive inpatient rehabilitation services. Concern has been raised that the capacity of existing inpatient rehabilitation facilities (IRFs) may not be adequate to meet the demands of an aging population.

Although the impact of prolonged length of stay (pLOS) on patient disability following hospitalization has been studied extensively,⁴ few investigators have evaluated the impact of discharge disposition as a reason for pLOS. We aimed to quantify the proportion of medically stable ischemic stroke patients with pLOS caused by a lack of IRF bed availability. Delays in approval of a patient's insurance also may be a contributing factor to pLOS.

Methods

We conducted a cross-sectional study of all ischemic stroke patients admitted to our center from July 2008 to December 2010 using data collected from a prospective registry.⁵ Patients were excluded if they arrived >48 hours after the time they were last seen without stroke symptoms, did not have a known time of stroke symptom onset, experienced an in-hospital stroke, or had incomplete data.

Patients with pLOS were identified as follows: First, the variable "Did the patient experience a prolonged hospital stay?" was collected in our stroke registry⁵ before the development of the aims of our research. The term *prolonged length of stay* was established before we designed the study and was defined by documentation within the disposition section of daily patient progress. pLOS was defined in our code book as hospitalization extended for 24 hours more than necessary to determine neurological stability and the appropriate next level of care or disposition for a given patient. Second, potential causes of pLOS were identified by further chart review and categorized as neurologic complications, non-neurologic medical complications (including hospital-acquired infections), delays caused by imaging, delays caused by procedure(s), and delays caused by arrangement of discharge disposition. To be considered a cause of pLOS, each of the medical complications must have occurred before documentation of appropriateness for discharge; pLOS resulting from delayed arrangement in discharge disposition must have been documented in a progress note 24 hours after both neurological stability and the initial documentation of the goal discharge disposition. Crude logistic regression analyses were performed to determine the odds of pLOS according to dichotomized insurance status (combined self-pay [uninsured] and Medicaid vs all others). The study was approved by the Tulane University institutional review board.

Results

Of the 274 patients who met inclusion criteria, 106 (38.7%) had pLOS. Only stroke severity, as measured by the baseline National Institutes of Health Stroke Scale score (with higher values corresponding to more severe disease), was significantly different in patients with and without pLOS (median 9 vs 5; $P = 0.0010$). Beyond this, there were no significant differences in baseline demographics, medical history, or insurance status (data not shown).

When assessing the reasons for pLOS, delays in arranging discharge disposition were the most common (48.1%), followed by non-neurologic medical complications (36.8%), delays in imaging studies (20.8%), awaiting procedure (10.4%), and neurologic complications (9.4%). LOS was prolonged for more than one reason in 13 (12.3%) patients. Among patients who experienced pLOS caused by delays in discharge disposition arrangement

(48.1%), a majority of these patients were sent to IRFs (50.3%) as compared with other facilities (eg, long-term acute care, skilled nursing facility, hospice). Compared with patients without pLOS, significantly more patients with pLOS were discharged to IRFs (42.3% vs 24.2%; $P < 0.0001$) and skilled nursing facilities (9.6% vs 5.0%; $P = 0.0387$). After dichotomizing insurance status (self-pay and Medicaid vs all others), insurance status was not predictive of pLOS for any reason (odds ratio 0.725, 95% confidence interval 0.310–1.695; $P = 0.4580$) and was not predictive of pLOS resulting from discharge disposition (odds ratio 0.885, 95% confidence interval 0.221–3.538; $P = 0.8624$).

Discussion

Our study found that nearly half of the patients with an unnecessary pLOS were awaiting discharge disposition. Although patients with pLOS appeared to have more severe strokes at baseline when compared with patients without pLOS, we have no reason to believe that patients with more severe baseline disease are any more likely than patients without to remain hospitalized for longer periods once neurologically stable for discharge. By this we mean that once patients are neurologically stable for discharge (as determined by progress notes), they should not be at greater risk of pLOS, despite more severe baseline neurologic disease.

The majority of the delays in disposition was to the result of delayed placement in an IRF. To put it simply, the root of this problem may be linked to one (or several) of three potential sources: delays within our center at preparing a patient for discharge, delays encountered by acquiring appropriate coverage from a patient's insurance (or lack thereof), and delays on behalf of the IRF at securing and/or providing a unit to a patient deemed medically stable for discharge. This likely reflects a combination of all of these sources.⁶ First, hospital progress notes document completion of medical management for stroke; discharge disposition planning may not have taken place soon enough during the patient's hospitalization to prepare the patient, insurance provider, and disposition facility for transfer of care. Second, although insurance status was not predictive of delayed discharge disposition (or discharge to IRFs) in our study, acquisition of appropriate levels of reimbursement for care may take a considerable amount of time and planning, regardless of the insurance provider. Furthermore, the most appropriate disposition is sometimes a moving target, changing as a patient improves or deteriorates, which can precipitate delay. We remain concerned whether the supply of IRFs is adequate to address the demands of the current number of stroke survivors, particularly because of the larger proportion of patients with pLOS discharged to IRFs compared with patients without pLOS (42.3% vs 24.2%) and our common experience of waiting for an IRF bed for patients pending discharge.

In 2010, the Medicare Payment Advisory Commission estimated that the 1180 established IRFs provided 35,440 beds.^{7,8} In 2009, nearly 1 million stroke patients were hospitalized.⁹ If nearly 85% of strokes are ischemic ($n = 850,000$)¹ and 32.3%² of acute ischemic strokes require inpatient rehabilitation ($n = 274,550$), then the 35,440 IRF beds reported in 2010 may not be adequate for ischemic stroke patient demands. Should these estimates be accurate, this raises considerable concern regarding the supply of IRF beds (permitting placement of <15% of stroke survivors in these facilities), particularly because studies have shown that fewer days from stroke symptom onset to rehabilitation admission are associated significantly with better functional outcomes.^{10,11}

Our study design and sample size prevent evaluation of systems-level changes at IRFs in our region. Available units may be declining on the national level, as described in the reports provided by the Medicare Payment Advisory Commission, in response to difficulty in acquiring adequate financial coverage from insurance programs¹² and/or more stringent

adherence to rehabilitation placement criteria, which we are unable to prove given the problems inherent in healthcare reimbursement when appropriateness for discharge to IRFs is called into question.¹³ Although we could not investigate these issues prospectively, it is our experience that it is becoming increasingly difficult to secure timely placement in IRFs for patients meeting criteria for rehabilitation following stroke, and this warrants further investigation, which we plan to pursue.

In the absence of data from our center before Hurricane Katrina in 2005, it is difficult to determine whether the delays in arranging discharge disposition result from fewer available units or inadequate financial coverage for patients who continue to reside in the Bayou region. As a next step, we plan to investigate which causes, if any, are the driving forces behind the delays in disposition arrangement in patients requiring rehabilitation after stroke.

Non-neurological medical complications (including hospital-acquired infections) also accounted for a significant proportion of patients experiencing pLOS and should not be ignored. Many of these events can be reduced but not fully prevented by using standards of care that include early discontinuation of urinary catheters and dysphagia examination before peroral intake. We recommend that each center continue to strictly enforce and monitor adherence to preventive strategies and aggressively monitor patients for and treat these complications. Infection prophylaxis with antibiotics has been demonstrated to reduce the incidence of infections following stroke¹⁴; however, antibiotic prophylaxis has not been shown to reduce mortality and is therefore not recommended. Heightened preventive measures certainly deserve greater attention in future clinical trials to improve outcomes and reduce LOS for these patients.

Delays in discharge resulting from imaging and procedures also were significant contributing factors. Because these results reflect extended patient hospitalization at a single center, we were unable to generalize these particular findings to other centers. We plan to implement quality improvement measures at our center to address these issues and recommend that other centers execute similar measures.

Although our investigation was limited by its small sample size from a single academic medical center and its retrospective nature, our definition of pLOS is unique. Contrary to studies that used an absolute threshold,⁴ we tailored our definition of pLOS to the patient, determining when each patient was neurologically stable for discharge. Because our definition of pLOS is subjective and dependent on clinical decisions made by the primary attending physician, differences may exist among clinical personnel who classify patients as having a prolonged hospitalization. Although we are aware of this potential bias, we are confident that the use of a more subjective definition for pLOS may provide greater clinical relevance pertaining to hospitalization duration. We also are limited by the possibility that our methods for identifying patients with pLOS (the identification of clear documentation of pLOS or delayed hospital discharge in progress notes) may have failed to identify all patients with pLOS because of poor source documentation; however, we believe this number to be small and likely not a significant contributor to the results.

Delayed discharge arrangements also may be explained by delayed planning on the part of the primary hospital team when preparation for discharge arrangements is not initiated at an appropriate stage during hospitalization. These arrangements should be prepared before neurological stabilization, but often are delayed while therapists waver on skilled nursing versus IRF appropriateness, by poor preparation on the part of the social or case worker, by difficulty securing approval from insurance providers, and/or by delayed responses from the rehabilitation facility in accepting a patient for transfer. Progress notes at our institution may describe completion of stroke management and disposition preparation, but disposition

planning can take several days with a protracted effort to come to fruition. Furthermore, because our institution is a comprehensive stroke center, the workup of patients by our team may be more encompassing and involve additional time in contrast to other institutions that may either perform a more limited stroke evaluation or plan for additional workup in the outpatient setting. Larger studies are needed to assess more specific factors that may contribute to delays in discharge disposition, particularly when arranging patient discharge to IRFs.

Conclusions

Prolonging hospitalization, as many physicians have noted, raises the risk of adverse neurological changes (eg, poststroke delirium, sundowning syndrome), physical deconditioning, and hospital-acquired infections that can contribute to overall morbidity in stroke patients.^{15,16} We recognize that in previous investigations delayed discharge arrangement was a leading contributor to prolonged hospitalization.¹⁷ It is, therefore, of paramount importance that inpatient care providers recognize the reasons for pLOS at their respective centers and act in such a way to reduce the period of hospitalization.

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Key Points

- More patients who experience stroke are surviving and may ultimately benefit from inpatient rehabilitation.
- The number of patients who survive stroke may exceed the number of available inpatient rehabilitation units.
- Delays in arranging discharge disposition, particularly to inpatient rehabilitation facilities, not only pose a physical risk to these patients (including the development of hospital-acquired infections) but they also inhibit the rehabilitation process.