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Original Research—CME

Evaluating Use of the Siebens Domain Management Model During Inpatient Rehabilitation to Increase Functional Independence and Discharge Rate to Home in Stroke Patients

David S. Kushner, MD, Kenneth M. Peters, MS, CCC-SLP, Doug Johnson-Greene, PhD

Abstract

Objective: To evaluate use of the Siebens Domain Management Model (SDMM) during stroke inpatient rehabilitation (IR) to increase functional independence and rate of discharge to home.
Design: Before and after study.
Setting: IR facility.
Participants: Before the intervention: 154 patients with ischemic/hemorrhagic strokes who were admitted to an IR facility in 2010; on average, they were admitted 9.1 days after receiving acute care. After the intervention: 151 patients with ischemic/hemorrhagic strokes who were admitted to an IR facility in 2012; on average they were admitted 7.3 days after receiving acute care. The comorbidity tier severity and prestroke living setting and living support appeared to be similar in both the preintervention and postintervention groups.
Intervention: Use of the SDMM involving weekly adjustments of IR care focused on potential barriers to discharge home including medical/surgical issues, cognitive/emotional coping issues, physical function, and living environment/community re-entry needs.
Main Outcome Measures: Use of Functional Independence Measure (FIM) score change during IR length of stay (LOS; FIM-LOS efficiency) and rates of discharge to community/home, acute care, and long-term care (LTC) to compare 2010/preintervention data with postintervention data from 2012, along with comparison of facility data to national aggregate data from the Uniform Data System for Medical Rehabilitation (UDSMR) for both years.
Results: Preintervention 2010 FIM-LOS efficiency was 1.44 compared with a 2012 postintervention FIM-LOS efficiency of 2.24, which was significant ($t = 4.3$; $P < .0001$). Comparison of the UDSMR 2012 national FIM-LOS efficiency score (1.72) to the 2012 postintervention score of 2.24 reached significance ($t = 2.6$; $P < .01$). In addition, a significant difference was found between groups for discharge location: In the preintervention group, 57.8% were discharged to home/community, 14.9% to LTC, and 27.3% back to acute care compared with the postintervention group, in which 81.2% were discharged to home/community, 9.4% to LTC, and 9.4% back to acute care ($\chi^2 = 8.98$; $P < .001$). Also significant was comparison between the 2012 postintervention group and the 2012 national UDSMR data for the same 3 discharge locations ($\chi^2 = 3.94$; $P < .05$). Comparison of 2010 to 2012 facility data then shows a 23.4% increase in discharge to the community compared with an increase of 5.8% for the UDSMR 2010 to 2012 data, representing a community discharge rate that is 4 times greater for the 2012 facility postintervention group ($\chi^2 = 83.596$; $P < .0001$).
Conclusions: Use of the SDMM during stroke IR may convey improvement in functional independence and is associated with an increased discharge rate to home/community and a reduction in institutionalization and acute-care transfers.

Introduction

Stroke is a leading cause of long-term disability among adults. The prevalence of Americans living with stroke currently ranges from 500 to 800 per 100,000 people and is expected to gradually increase as the U.S. population ages [1,2]. Direct and indirect costs to society resulting from stroke in the United States, including the costs from lost productivity, medical complications, and institutional care, were estimated at >$73 billion in 2010 [2]. These statistics highlight the increasing importance of the role of stroke inpatient rehabilitation (IR) in limiting the costs to society by maximizing functional recovery, preventing secondary

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medical complications, and promoting the discharge of stroke patients to their home/community.

The discharge rate of stroke patients to their home/community from IR is limited by the rate of institutional discharges to long-term care and by transfers back to acute-care facilities/wards as a result of medical complications. Multiple interacting medical, physical, functional, and social risk factors place persons who have had a stroke at an elevated risk for institutionalization. These factors are summarized in Table 1 [3-18]. IR plays an important role in ameliorating the risk for institutionalization of patients after a stroke [18-21]; however, even with IR, as many as 13%-45% of patients may still require a discharge to long-term care after a stroke, with the rate varying with risk factor interaction [7,11,22]. Also, 54%-75% of stroke patients have at least one medical complication during IR [23-25], and 19% or more may require discharge from IR back to acute care as a result of complications associated with comorbid conditions or because of potential complications of immobility and stroke [25]. A vigilant and proactive approach during IR may enhance stroke patient outcomes, including the successful discharge of these patients to their home/community while concomitantly reducing the rate of institutionalization and of transfers back to acute care.

The domain management model (DMM) is an organizational/conceptual framework for problem solving used by teams of professionals in business, engineering, computer sciences, informational technology, and now increasingly in health care. This model may be useful in enhancing outcomes of IR stroke patients. DMMs facilitate sharing of information between various groups of professionals for the purpose of enhancing decision making. In health care, DMMs have been used in an effort to improve patient care outcomes and transitions of care while facilitating emergency acute care, chronic medical care, geriatric care, the function of hospital information systems, discharges from hospital acute care, and long-term care of stroke patients [26-32].

The Siebens DMM (SDMM) is increasingly being used as a health care management tool to improve patient outcomes in acute and chronic care [27-32]. The SDMM for stroke IR provides a standard format for weekly interdisciplinary team conferences, with the focus on potential medical, physical, cognitive, emotional, and social barriers to recovery and barriers to community/home discharge. A search of the literature revealed that a study had not yet been performed to evaluate the use of the SDMM in improving functional outcomes and discharges to home/community while reducing acute care transfers and institutionalization in IR stroke patients. Thus the goal of this study was to investigate the use of SDMM during IR to improve functional outcomes and discharge disposition for stroke patients.

Table 1
Risk factors for institutionalization after stroke

- Impaired cognition
- Functional dependence in 3 or more activities of daily living
- Age >85 years
- Impaired balance
- Dementia
- Inability to use the toilet or bathe
- Depression
- Risk for falls
- Poor insight
- Female gender
- Prior nursing home care
- Living alone prior to stroke
- No available caregiver
- Lack of socioeconomic resources
- Impaired vision/blindness
- Obesity
- Underweight/malnourishment
- Pressure sores
- Uncontrolled pain
- Impaired communication
- Ischemic stroke
- Apathy
- Incontinence
- >5 Chronic medications/multiple comorbidities

Data from references 3-18.

Methods

Participants

This before and after observational study included all IR patients with ischemic and/or hemorrhagic hemisphere and brainstem/cerebellar strokes who were admitted to HealthSouth Rehabilitation Hospital in Miami, Florida, in 2010 and 2012. No exclusion criteria were implemented; all stroke patients from the Uniform Data Systems for Medical Rehabilitation (UDSMR) Metrics Reports for the facility for the corresponding years were included. Of these patients, in 2010, 82% had acute strokes and 18% had late effects of a stroke, and in 2012, 83% had acute strokes and 17% had late effects of a stroke. Acute stroke was defined as any acute ischemic and/or hemorrhagic hemisphere and brainstem/cerebellar stroke that required an acute hospitalization immediately prior to IR. A late-effect stroke was defined as any subacute or chronic stroke that resulted in persistent neurologic deficits, including hemiparesis or monoparesis of an upper or lower extremity that impaired activities of daily living and mobility/ambulation. A proportion of late-effect stroke patients were admitted to IR from an acute care hospital, home, assisted living facilities, skilled nursing facilities, and subacute rehabilitation. The preintervention group included 154 patients admitted in 2010 an average of 9.1 days after an acute care hospitalization for stroke. The postintervention group included 151 patients admitted in 2012 an average of 7.3 days after an acute care hospitalization for stroke. The average time to IR admission after acute