Assessment of Patient Outcomes of Rehabilitative Care Provided in Inpatient Rehabilitation Facilities (IRFs) and After Discharge: Study Highlights for Spinal Cord Injury (SCI) Patients

Background: Patients with moderate to severe grade spinal cord injury (SCI) experience long-term, often permanent, neurological deficits and are at increased lifelong risk of rehospitalization from secondary comorbid conditions (e.g., urinary tract infections and pressure ulcers).[1,2] While SCIs include traumatic and nontraumatic etiologies, U.S. incidence and prevalence estimates only capture trauma-related SCIs. According to the Centers for Disease Control and Prevention, there are up to 20,000 new traumatic SCI cases each year and an overall prevalence of approximately 200,000 persons.[3,4] The incidence of nontraumatic SCI is believed, however, to be significantly greater than trauma-related SCI.[4,5] Patients with either etiology are shown to benefit from specialized inpatient rehabilitation programs that utilize multidisciplinary approaches to establish patients' therapeutic goals and design injury-specific rehabilitation regimens that include closely monitoring patients' functional, cognitive, and self-care performance.[6,7,8,9,10]

Key Findings: Results from our analysis of 4,068 clinically and demographically matched skilled nursing facility (SNF) to IRF SCI patients finds that IRF-rehabilitated patients experience better long-term clinical outcomes than SCI patients who received rehabilitation in a SNF. The average length of rehabilitation stay for the IRF cohort was nearly 40 percent shorter than the average SNF patient stay (13.5 vs 22.2 days; $p < 0.0001$). Following the initial rehabilitation stay, compared to matched SNF discharged SCI patients, IRF patients experienced on average (all statistically significant at $p < 0.0001$ unless otherwise noted):

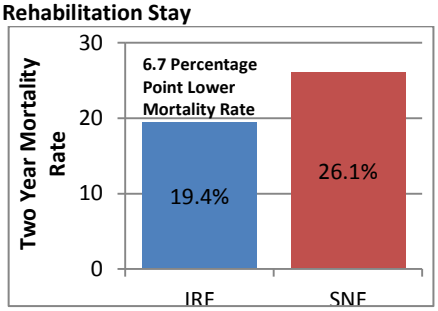
- ***25.7 percent (6.7 percentage point difference) lower all-cause mortality rate*** over a two-year period
- ***45.3 day difference in days alive*** over a two-year period
- ***41.0 more days residing at home*** (i.e., not receiving facility-based care) over a two year period
- ***80.3 fewer emergency room visits*** per 1,000 patients per year ($p = .005$)
- Cost $20.66 more per day observed over a two-year period

We observed no statistically significant difference in annual readmission rates between IRF and SNF SCI patients.

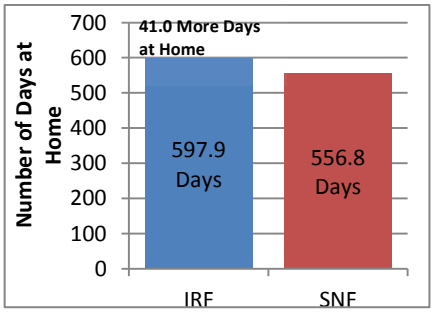
Discussion: Our findings indicate that SCI patients treated in IRFs experience better clinical outcomes than matched SCI patients who received rehabilitation in a SNF. This observation may be the result of key differences in the multidisciplinary, hospital-level resources and capabilities between IRF and SNF settings.[6,10] Unlike SNFs, IRFs are required to use an interdisciplinary approach to rehabilitative care.[11]

The proportion of elderly Americans who sustain SCIs has increased in recent years,[12] as has their rates of rehospitalization[1] and admission to nursing homes.[4] That IRF-placed SCI patients in our study had lower mortality and less facility-based care after rehabilitation underscores the importance of policies that preserve, if not expand, access to IRF services for the SCI patient population.

Difference in Mortality Rate between IRF and SNF SCI Patients Two Years after Initial Rehabilitation Stay

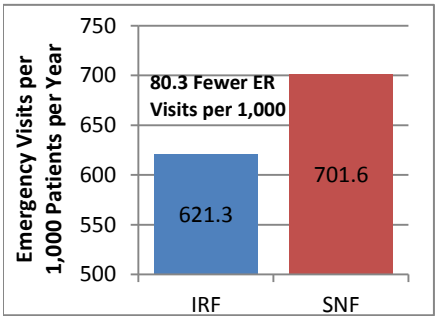


Difference in Number of Home Days* between IRF and SNF SCI Patients Over Two Years



*Number of days not receiving facility-based care

Difference in Emergency Visits per 1,000 Patients per Year between IRF and SNF SCI Patients



Source: Dobson | DaVanzo analysis of research identifiable 20% sample of Medicare beneficiaries, 2005-2009

[1] Cardenas DD, Hoffman JM, Kirshblum S, et al. Etiology and incidence of rehospitalization after traumatic spinal cord injury: a multicenter analysis. *Arch Phys Med Rehabil*. 2004; 85:1757-63.
[2] DeJong G, Tian W, Hsieh C-H, et al. Rehospitalization in the first year of traumatic spinal cord injury after discharge from medical rehabilitation. *Arch Phys Med Rehabil.* 2013; 94(4 Suppl):S87-97.
[3] Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, Division of Injury Response. November 2010. Accessed July 2014: http://www.cdc.gov/traumaticbraininjury/scifacts.html.
[4] DeVivo MJ. Epidemiology of traumatic spinal cord injury: trends and future implications. *Spinal Cord*. 2012; 50:365-72.
[5] New PW, Simmonds F, Stevermuer T. A population-based study comparing traumatic spinal cord injury and non-traumatic spinal cord injury using a national rehabilitation database. *Spinal Cord*. 2011; 49:397-403.
[6] McKinley WO, Seel RT, Hardman JT. Nontraumatic spinal cord injury: incidence, epidemiology, and functional outcome.*Arch Phys Med Rehabil*. 1999; 80:619-23.
[7] Kennedy P, Chessell ZJ. Traumatic versus non-traumatic spinal cord injuries: are there differential rehabilitation outcomes? *Spinal Cord.* 2013; 51:579-83.
[8] New PW. Functional outcomes and disability after nontraumatic spinal cord injury rehabilitation: results from a retrospective study. *Arch Phys Med Rehabil.* 2005; 86:250-61.
[9] Kirshblum SC, Priebe MM, Ho CH, et al. Spinal cord injury medicine. 3. Rehabilitation phase after acute spinal cord injury. *Arch Phys Med Rehabil.* 2007; 88 (3 Suppl 1): S62-70.
[10] Parent S, Barchi S, LeBreton, Sasha S, et al. The impact of specialized centers of care for spinal cord injury on length of stay, complications, and mortality: a systematic review of the literature. *J Neurotrauma*. 2011; 28:1363-70.
[11] Medicare Payment Advisory Commission. March 2014. *Report to the* Congress. Washington, D.C.: MedPAC.
[12] DeVivo MJ, Chen Y. Trends in new injuries, prevalent cases, and aging with spinal cord injury. *Arch Phys Med Rehabil.* 2011; 92:332-8.