

Care in a Model SCI Trauma Center Leads to Shorter Acute Care Lengths of Stay Compared to Non-sci Trauma Centers

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Objective: To compare acute care lengths of stay (LOS) and medical status of patients admitted to inpatient rehabilitation from a Model spinal cord injury (SCI) Trauma Center or from a non-SCI acute hospital.

Design: Retrospective database review

Introduction: In 1970, the Rehabilitation Services Administration of the US Department of Health, Education and Welfare funded the first demonstration project to establish a comprehensive, multi-disciplinary Model System of Spinal Cord Injury Care. One of its primary goals was to evaluate the efficiency of such a system. (Stover et al, 1999) Although several studies have demonstrated that patients admitted to model SCI systems soon after injury tended to have better short-term and long-term outcomes than patients whose admission to a Model System was delayed (DeVivo et al. 1990, Oakes et al. 1990), information on acute care in non-Model System facilities has been limited.

At the RSCICDV at Thomas Jefferson University Hospital (TJUH)/Magee Rehabilitation, one of the most significant changes over the past 5 years has been the decline in the number of admissions within 3 days of injury. Because there are 5 Level 1 Trauma Centers in the greater Philadelphia region, not all patients

with acute traumatic SCI are sent to TJUH for acute care. However many of these patients are sent to Magee for initial rehabilitation. Currently only about half of patients with traumatic SCI are admitted to Magee from TJUH. This change in referral pattern has provided us with a unique opportunity to study differences between those admitted acutely (within 24 hours of injury) to a designated Model SCI System of Care Level 1 Trauma Center and those admitted directly to the rehabilitation component from other Non-SCI Trauma Centers in the region.

Subject and Methods: A retrospective database and chart review was performed on 281 individuals with spinal cord injury from 2005 to 2007. Of the 281 individuals with SCI, 78 were admitted within 24 hours of injury to TJUH and the remaining 131 were admitted directly to the inpatient acute rehabilitation SCI Unit at Magee Rehabilitation Hospital from other non-SCI Level I Trauma Centers in the region. Individuals were stratified by level and severity of injury, motor complete (AIS A and B)/ incomplete (AIS C and D) tetraplegia/paraplegia (See table 1). Mean acute care LOS were compared and log-transformed to normalize the distribution. Percentage of pressure sores, minor (Grade 1 and 2) and major (Grade 3 and 4) on admission to rehabilitation and medical readmissions back to acute care within 30 days of initial inpatient rehabilitation were compared.

Results:

- Patients admitted to rehabilitation from an SCI trauma center had significantly shorter acute care LOS than patients admitted from a non-SCI trauma center (Table 1).
- This difference was still significant after adjusting for neurological category.
- By neurological category, acute care LOS was less for all groups admitted from the SCI center, but statistically only for tetraplegia: motor complete (22.8 vs. 53.5 days, $p < .01$) and motor incomplete (13.3 vs. 23.0 days, $p < .05$).
- There was no significant difference in the incidence of readmissions to acute care from rehabilitation (27% SCI center, 32% non-SCI Center).
- More patients from non-SCI centers (44%) than SCI centers (24%) had decubitus ulcers (Chi-square $p < .01$). (Figure 1)
- The percentage of patients with grade III and IV pressure ulcers was similar. (Figure 2)

Table 1: Acute Care Length of Stay: SCI versus non-SCI Trauma Center

	SCI TC (Jeff)	Non SCI TC	SCI TC (Jeff)	Non SCI TC	SCI TC (Jeff)	Non SCI TC	P value
	N	N	Age	Age	Acute LOS	Acute LOS	
Para AIS A and B	25	45	39.3	30.4	20.9 ± 11.5	33.3 ± 45.1	0.588
Para AIS C and D	6	12	46.2	38.4	13.0 ± 10.8	21.6 ± 23.0	0.467
Tetra AIS A and B	12	38	33.4	40.2	22.8 ± 15.4	53.5 ± 50.5	<0.05
Tetra AIS C and D	35	36	52.6	47.8	13.3 ± 10.3	23.0 ± 23.3	<0.01
Total	78	131	42.88	39.2	17.2 ± 12.2	35.4 ± 42.2	<0.001

Discussion: These results suggest that acute care in an organized SCI Level I Trauma Center can significantly reduce LOS compared to non-SCI Level I Trauma Centers. Average LOS was more than 50% less in the SCI trauma Center. This was accomplished without an increase in transfers back to acute care for unstable medical conditions. There was also a threefold increase in incidence of pressure ulcers in non-SCI Trauma Centers. Pressure ulcers increase the cost of care, and can delay or prolong rehabilitation due to restrictions in sitting. Providing a coordinated, multidisciplinary system of acute care and rehabilitation for individuals disabled by SCI allows staff to develop expertise in SCI care and allows patients to begin initial rehabilitation sooner and in better condition.

Conclusion: Acute care in organized SCI trauma centers can significantly lower LOS compared to non-SCI trauma centers. Patients admitted to rehabilitation from SCI trauma centers are less likely to develop pressure ulcers and no more likely to be sent back to an acute hospital.

Figure 1: Any Pressure Ulcer
SCI versus non-SCI Trauma Center

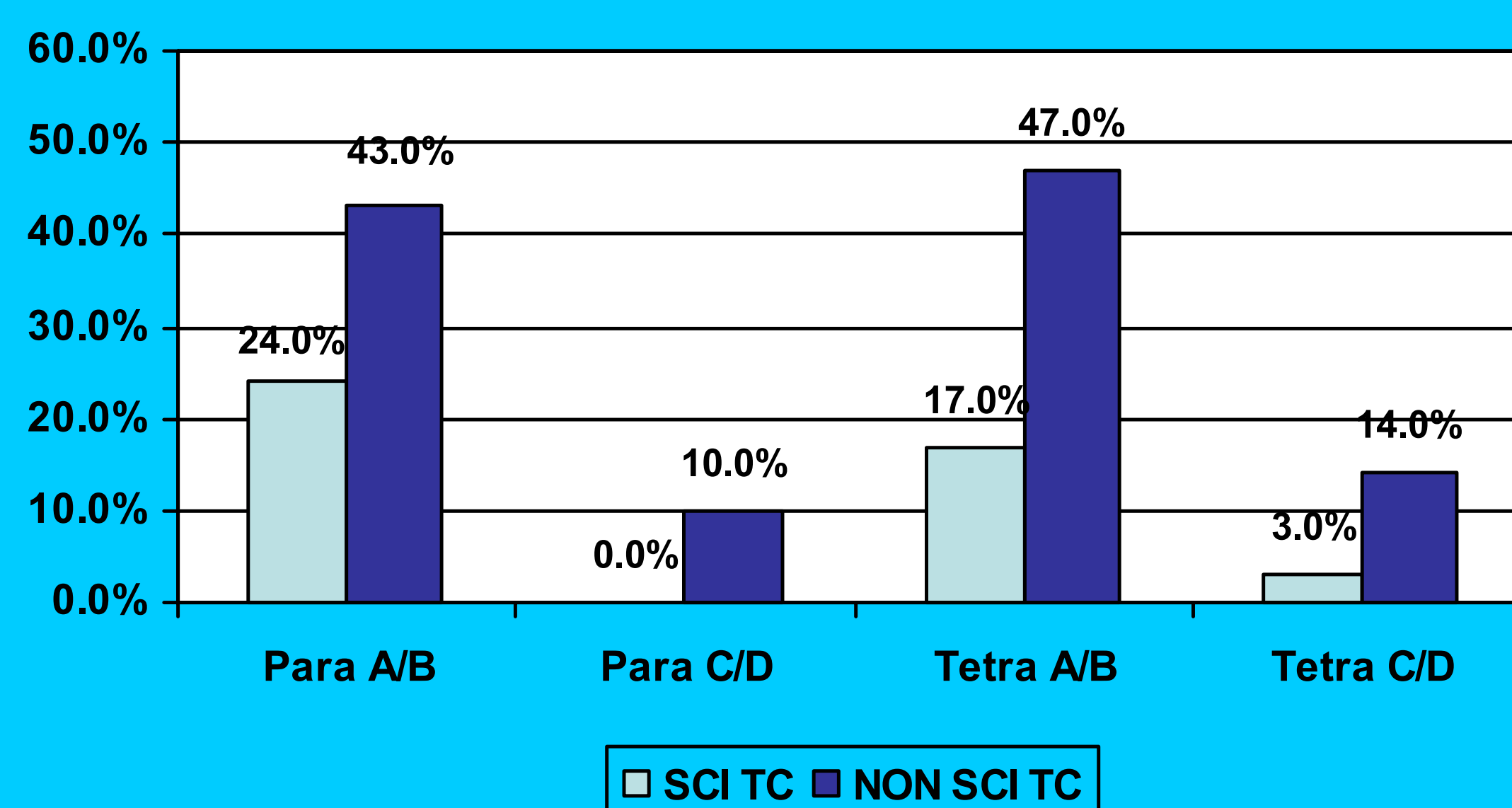
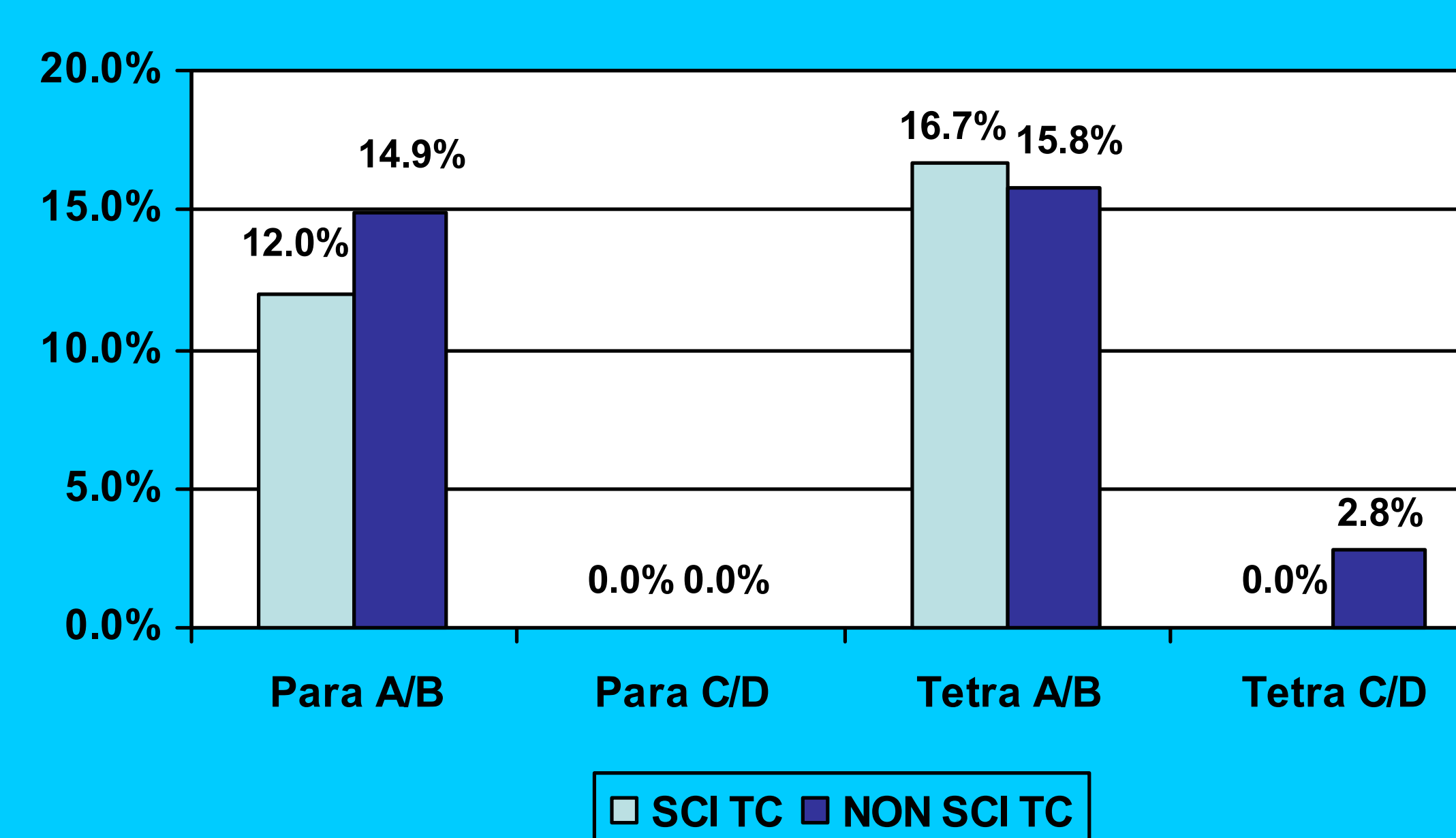


Figure 1: Grade III and IV Pressure Ulcers
SCI versus non-SCI Trauma Center



References:

1. Stover, S.L., DeVivo, M.J., Go, B.K. (1999). History, implementation, and current status of the National Spinal Cord Injury Database. *Arch Phys Med Rehabil*, 80; 1365-1371.
2. DeVivo, M.J., Kartus, P.L., Stover, S.L., Fine, P.R. (1990). Benefits of early admission to an organized spinal cord injury care system. *Paraplegia* 28; 545-555.
3. Oakes, D.D., Wilmont C.B., Hall, K.M., Sherck, J.P. (1990). Benefits of early admission to a comprehensive trauma center for patients with spinal cord injury. *Arch Phys Med Rehabil*, 71; 637-643.
4. Heinemann, A.E., Yarkony, G.M, Roth, E.J., et al. (1989). Functional outcome following spinal cord injury: a comparison of specialized spinal cord injury center vs. general hospital acute care. *Arch Neurol*, 46:1098-1102.
5. Yarkony, G.M., Bass, L.M., Keenan, V., Meyer, P.R. (1985). Contractures complicating spinal cord injury: incidence and comparison between spinal cord centre and general hospital acute care. *Paraplegia* 23(5); 265-271.