

ACADEMY OF SPINAL CORD INJURY PROFESSIONALS

Spinal Cord Injury due to Tumor: Insights from the Veterans Health Administration SCI/D Registry

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Background and Objectives

- Worldwide, benign and malignant tumors are estimated to be the second-most common etiologic category receiving acute inpatient rehabilitation (AIR) for non-traumatic spinal cord injury (NTSCI), accounting for **23%** of that population (P. New *et al.*, 2015).
- NTSCI due to tumor (here, NTSCI-tumor) portends a significantly worse survival prognosis than other NTSCI etiologies.
- The Veterans Health Administration (VHA) Spinal Cord Injury and Disorders (SCI/D) directive mandates the SCI/D System of Care treat Veterans with benign NTSCI-tumor but leaves it optional whether to provide care for malignant NTSCI-tumor at VA SCI/D Centers. That decision is to be based on prognosis, local facility resources, and where the Veteran will receive the best care.

This Registry-based cross-sectional analysis was performed to support SCI/D System of Care operations and clinical decision-making. It represents the first public description of the NTSCI-tumor Veteran population.

Methods

We analyzed NTSCI-tumor etiology within three cohorts of NTSCI Veterans:

- VHA SCI/D Registry patients who received care between October 2012 and December 2021 (limited to n=7214 with NTSCI)
- The subgroup with SCI/D onset during Fiscal Years (FY) 2018-2020 (n=1502 with NTSCI)
- The subgroup that received AIR at VHA SCI/D Centers during FY2018-2020 (n=525 with NTSCI)

Data sources were the VHA SCI/D Registry and a database of AIR outcomes. Descriptive (counts and proportions) and comparative (chi-square for categorical variables, T-test and Mann Whitney U for continuous variables) analyses were performed for each group using non-tumor NTSCI for comparison.

Table 1: Prevalence of NTSCI-Tumor in 3 Registry Cohorts

NTSCI Etiology	Entire Registry NTSCI	NTSCI Onset in FY2018-2020	VHA AIR for NTSCI in FY2018-2020
Columnar Degeneration	56.5%	61.7%	63.1%
Infection	10.4%	9.5%	11.9%
Vascular	8.9%	7.7%	9.6%
Tumor	8.8%	9.4%	7.3%

Results

- The 545 NTSCI-tumor Veterans represent 8.8% of all patients in the entire VA SCI/D Registry with a specific NTSCI etiology, making NTSCI-tumor the 4th most common NTSCI etiology in the Registry population (Table 1). For the FY2018-2020 onset cohort and the AIR cohort, NTSCI-tumor account for 9.4% and 7.3% of NTSCI, respectively.
 - Rates are similar to the 2nd and 3rd most common NTSCI etiologies: infections and vascular conditions.
 - When considered as a proportion of all SCI/D patients (both traumatic and NTSCI), the percentage of catchment area VHA SCI/D Registry populations with NTSCI-tumor for each VA SCI/D Center varied widely, from less than two percent to over five percent. (Figure 1)
- In the overall registry cohort, NTSCI-tumor had a younger age at onset (p < .001) and greater incidence of paraplegia (p < .001) than non-tumor NTSCI. (Table 2)
- Veterans with NTSCI-tumor in the AIR subgroup had no significant difference in rehabilitation length of stay (p = .410) or Functional Independence Measure motor efficiency scores (p = .228) versus non-tumor NTSCI.
- In the group with onset during FY2018-2020, mortality risk was greater (p < .001) in NTSCI-tumor versus other NTSCI etiologies, with approximately 20% mortality in the first year after onset. (Figure 2)

Table 2: Demographics

	NTSCI non-Tumor		NTSCI-Tumor	
Sample Size	6669		545 (8.8% of patients with specified NTSCI etiology)	
Age at onset	Median 59		Median 54	
Neurologic Level of Injury	Count	(%)	Count	(%)
C1-C4	1942	29.1%	78	14.3%
C5-C8	1181	17.7%	52	9.5%
T1-T12	1419	21.3%	236	43.3%
L1-S5	835	12.5%	93	17.1%
Unknown	1292	19.4%	86	15.8%
Completeness of Injury				
AIS A	443	6.6%	62	11.4%
AIS B	224	3.4%	30	5.5%
AIS C	720	10.8%	81	14.9%
AIS D	3947	59.2%	279	51.2%
AIS E	177	2.7%	10	1.8%
Unknown	1158	17.4%	83	15.2%

Conclusions

- Compared with a previous non-VHA description of acute inpatient rehabilitation for NTSCI at 9 SCI units internationally, this represents a **notably lower proportion for NTSCI due to tumor: 23%** internationally vs. 7% of VA AIR.
- As in non-VA NTSCI-tumor cohorts, the VHA SCI/D Registry NTSCI-tumor population is slightly **younger** at onset, more likely to have **paraplegia**, and has **worse survival** than non-tumor NTSCI, although not as poor as reported for malignant spinal cord tumors in non-VA populations.
 - Likely, most patients in all 3 VA cohorts have **benign tumors**
- Unlike previous non-VA cohorts, there was no significant difference in rehabilitation outcomes versus non-tumor NTSCI.

Currently, the VHA SCI/D Registry does not delineate benign from malignant tumor etiology. Revision of the VHA SCI/D Registry etiology categories by addition of tumor-malignant and tumor-benign would further align the variable with the International SCI Data Sets etiology core variable. This would enhance the ability to track provision of services to the subpopulation with malignant tumors by the SCI/D Centers.

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Figure 1: Tumor as Percent of Entire Registry Population (including traumatic SCI) at each VA SCI/D Center

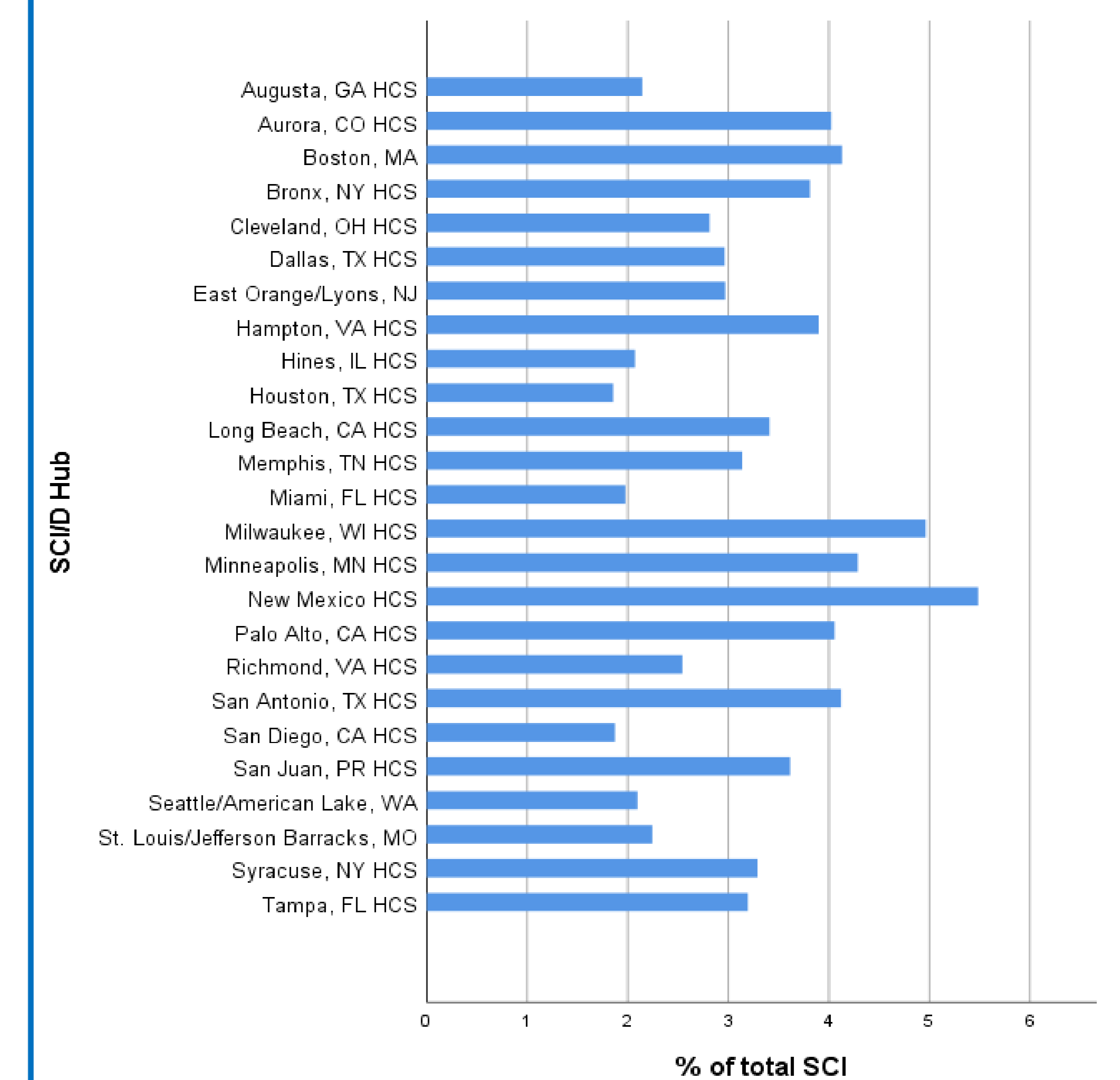


Figure 2: Survival of NTSCI-Tumor vs. NTSCI-non-Tumor Veterans (Cohort with onset in FY2018-FY2020)

