

The Incidence of Pneumonia, Wound Infection and Sepsis (PWS) in Patients with Acute Traumatic Spinal Cord Injury (SCI) and its Association with Neurological recovery and Functional outcomes: Pooled analysis using the NACTN/STASCIS database

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INTRODUCTION

Pneumonia, wound infection and septicemia (PWS) are amongst the leading cause of mortality during acute admission for spinal cord injury (SCI).

Although acquired infections are preventable, the reported incidence in the literature is surprisingly high, with studies reporting variable incidence rates between 23% – 80%.

Evidence suggest that individuals with SCI are at increased susceptibility to secondary infection.

From an outcomes perspective, there is limited insight pertaining to the impact that secondary acquired infections post SCI might have on long term clinical recovery.

OBJECTIVE

To evaluate the predictive factors for development of secondary PWS after SCI and to assess the relationship between secondary infections and long-term clinical recovery.

METHODS

Study population: The prospective data from the North American Clinical Trials Network (NACTN) SCI registry and the Surgical Timing in Acute SCI (STASCIS) study were pooled.

NACTN cohort enrolled SCI patients admitted between 2005 and 2017 at 11 University-affiliated hospitals. STASCIS cohort were enrolled at 6 hospitals between 2002 and 2009.

METHODS

The pooled cohort was divided into 2 groups based on whether secondary PWS was diagnosed during the acute admission.

The effect of PWS on ASIA Impairment Scale (AIS) grade improvement ≥ 1 point, respiratory function and ambulation (assessed according to the Spinal Cord Independence Measure – SCIM II) six months after the time of injury was evaluated.

The relative importance of predictors of PWS was studied using Dominance analysis.

For outcome analysis, penalized maximum likelihood regression models were fitted, with adjustment for relevant clinical covariates.

A random effect meta-analysis model was used to adjust for the fixed effect of study.

RESULTS

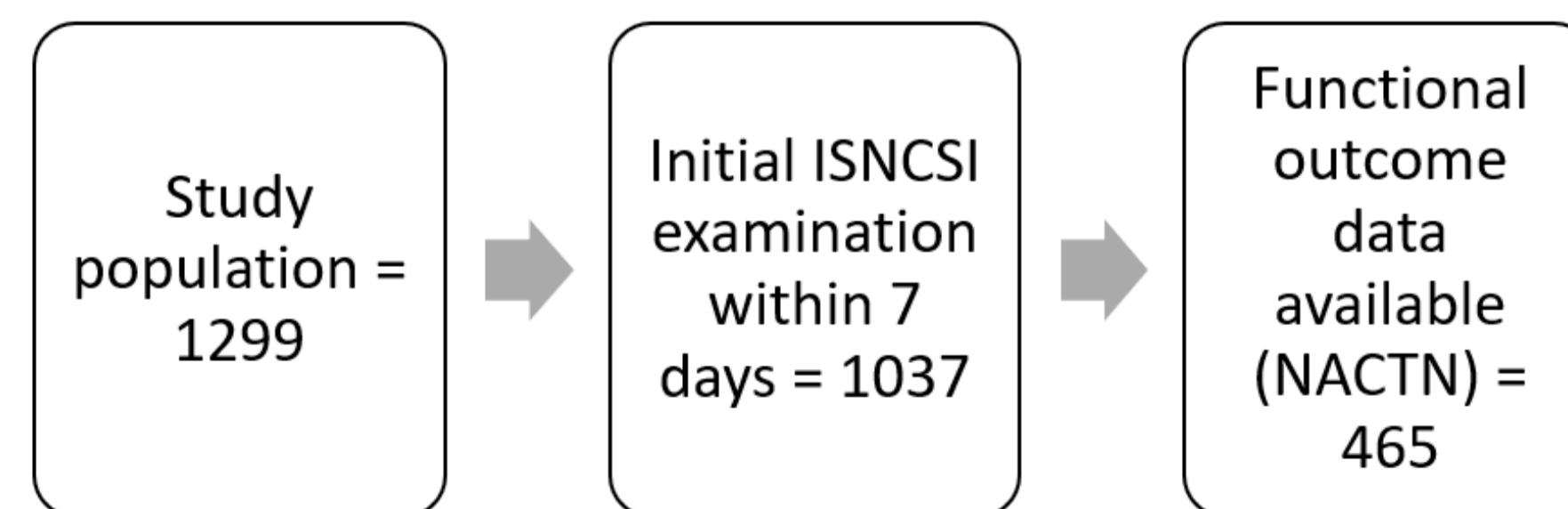


Figure 1: Flowchart of patients analysis

RESULTS

Predictor	Rank	Standardized Weight
Injury level	1	0.3335
Initial AIS grade	2	0.3252
Premorbid Status	3	0.1187
Steroid use	4	0.1051
Timing of surgery	5	0.0778
Sex	6	0.0362
Age	7	0.0023
Injury mechanism	8	0.0012

Table 1: Importance of predictors of pneumonia, wound infection and sepsis during acute hospitalization for SCI. Ranked in order of hierarchy from strongest predictor to weakest.

Standardized weight is the general dominance weight from McFadden R^2 normalized or standardized to be out of 100%

Predictors	Need Breathing support at 6 months	Need walking aid at 6 months
PWS: No	-	-
Yes	3.91 (1.42 – 10.79)	3.94 (1.50 – 10.38)
Sex: Female	-	-
Male	0.62 (0.19 – 1.98)	0.79 (0.36 – 1.72)
Level: Cervical	-	-
Thoracic	0.74 (0.18 – 3.12)	1.52 (0.64 – 3.60)
Lumbar/sacral	0.91 (0.04 – 17.79)	3.36 (1.12 – 10.06)
Baseline AIS: A	-	-
B	0.66 (0.15 – 2.87)	0.25 (0.07 – 0.89)
C	1.24 (0.37 – 4.20)	0.06 (0.02 – 0.18)
D	0.24 (0.04 – 1.46)	0.02 (0.01 – 0.06)
Time to surgery: >24Hr	-	-
≤ 24Hr	1.91 (0.64 – 5.73)	1.36 (0.71 – 2.61)

Table 2: Adjusted analysis assessing the association of pneumonia, wound infection and sepsis with functional outcomes.

RESULTS

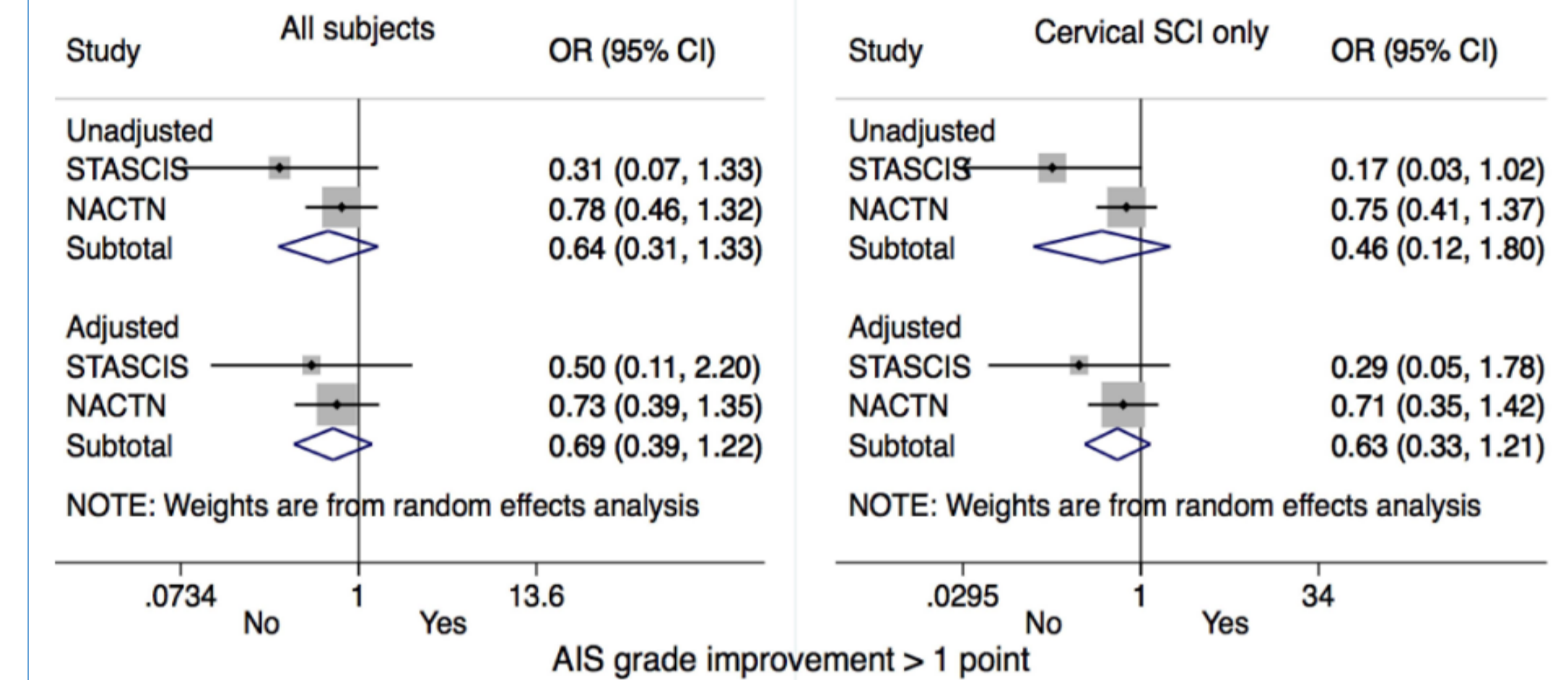


Figure 2: Forest plot showing a trend towards poor neurological recovery at 6 months among the group who developed pneumonia, wound infection and/or sepsis during acute admission.

CONCLUSION

The three strongest predictors of PWS during acute admission for SCI were injury level, initial AIS grade and premorbid medical status.

The occurrence of PWS during the acute admission for SCI is associated with poor long term neurological recovery and functional outcomes.

The findings of this study warrants greater vigilance and strategies to improve prevention, early identification and effective treatment of severe secondary infections in patients with spinal cord injury.



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Disclosure

No relevant disclosures which will impact the results of this study