Neurological Classification Changes During Inpatient Rehabilitation for Acute Spinal Cord Injury

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Background

Rehabilitation following acute SCI is a key timeframe during which neurologic recovery occurs. Assessment of neurologic status, using the International Standards for Neurological Classification of Spinal Cord Injury (ISNCSCI), is commonly performed. The E-ISNCSCI is an expedited option that determines neurological classifications, including levels and the American Spinal Injury (ASIA) impairment scale (AIS), while omitting portions of the full ISNCSCI exam that are unlikely to affect the assigned classifications. This greatly reduces the time required for examination and facilitates determination of neurologic classifications at multiple timepoints during inpatient rehabilitation (IPR).

Methods

A review was conducted of physician neurologic exams and classifications (full ISNCSCI or E-ISNCSCI) for all patients admitted within 90 days of injury to our SCI unit for initial IPR during fiscal year 2022 who had more than one exam documented.

Results

Of 25 patients receiving IPR, 16 (64%) had traumatic etiologies, 17 (68%) had tetraplegia, and 21 (84%) had AIS C or D. The first exam was performed a median of 31 days post-injury, and on average 2.3 interval exams were performed at a median interval of 35 days. The 58 interval exams, including discharge exams, nearly always were performed using the E-ISNCSCI. Typically, all key muscles were tested, which allowed calculation of upper extremity, lower extremity, and total motor scores (UEMS, LEMS, TMS) for most exams. Examiners assigned a correct neurologic level of injury (NLI) for over 90% of E-ISNCSCI exams.

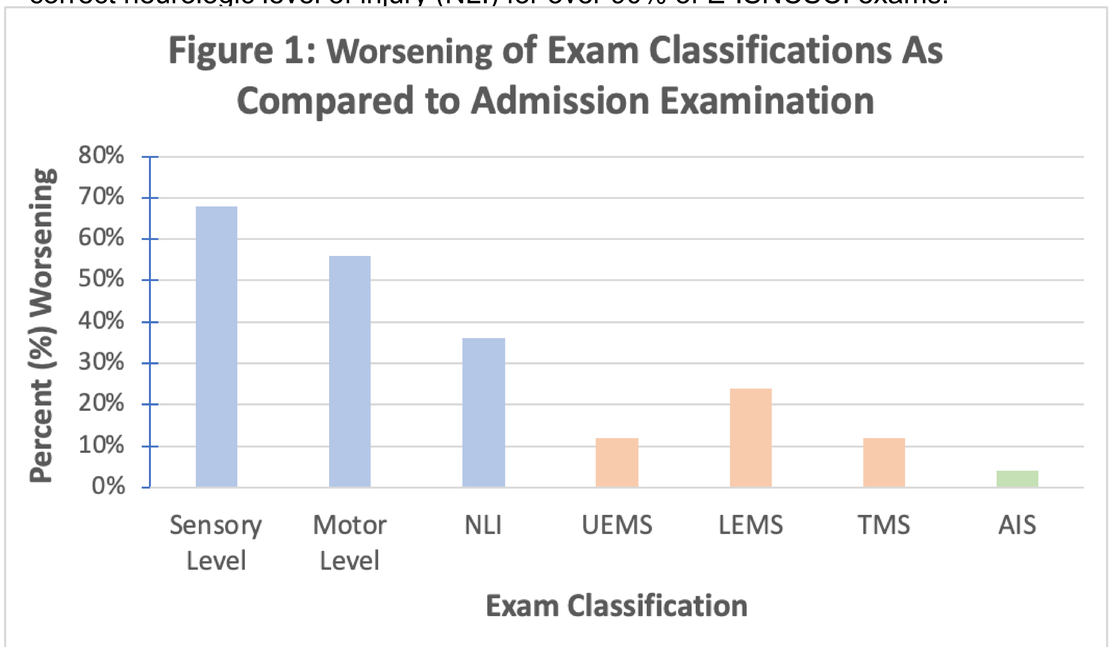

Figure 1: percentage of patients who showed worsening of neurologic classifications on any interval exam during IPR, as compared to admission classifications.

Discussion

As illustrated in Figure 1, worsening of motor level classification on either side occurred at some point during IPR in most patients (n=14; 56%). Motor level worsening usually occurred due to the ipsilateral sensory level ascending to C1 – C3, and not due to increased muscle weakness. Improved right or left motor levels versus admission were found on 28% and 35% of interval exams, respectively. In contrast, composite motor scores (UEMS, LEMS, and TMS) generally showed improvement or neurologic stability at interval exams. These scores worsened at some time point during IPR in only 12%, 24%, and 12% of patients ($p=0.001$, 0.02, and 0.001, respectively, for comparisons versus the 56% rate of motor level worsening). Improved scores versus admission were present on 63%, 69%, and 81% of follow-up exams for UEMS, LEMS, and TMS scores, respectively. Five patients (25%) showed improved AIS between admission and discharge.

Conclusion

Interval exams during IPR frequently show worsening motor levels when compared to admission exams. In contrast, composite motor scores such as TMS typically show improvement on interval examinations and are preferred for tracking improvement during IPR.