Improved Traumatic Spinal Cord Injury Management: A Multidisciplinary Educational Effort

Holly Riley[1], Catherine McGaughey[1], Heather Bonaparte[2], & Daniel Grabo[3]
[1]WVU Medicine JMMTC, [2]WVU Medicine CCTI, [3]WVUSOM Department of Surgery

BACKGROUND

Spinal cord injuries (SCI) require intense care due to high risk of multiple complications including:

- 20% develop a pressure related injury[1]
- 10.9% experience deep vein thrombosis[2]
- 22% develop a urinary tract infection[3]
- 95% of tetraplegia patients develop pneumonia[4]

To address the complexities of care for the SCI patient and standardize care across our hospital, we developed the novel SCI Management Course.

SMART OBJECTIVE

We aimed to increase the confidence and knowledge of providers tending to SCI patients through a SCI Management Course.

IMPROVEMENT ACTION PLAN WITH ACTIONS TAKEN

The SCI Management Course is offered to all providers and includes the following topics:

- Didactics:
  - Pathophysiology
  - Pharmacology
  - Nutrition
  - SCI-focused nursing strategies
  - Care management
- Active learning stations:
  - Occupational therapy
  - Physical therapy
  - Respiratory therapy

Assessment plan:

- Pre- and post- knowledge-based assessments
  - 20 questions
- Pre- and post- confidence surveys
  - 16 SCI management skills
  - 5-point Likert Scale

Data Analysis:

- Wilcoxon Signed-Rank Test ($\alpha = 0.05$) to compare:
  - Pre- and post course KBA total scores
  - Pre- and post course numeric confidence ratings
- McNemar's Test ($\alpha = 0.05$) to compare:
  - Pre- and post course correct response rates

RESULTS

- 174 providers from multiple disciplines attended the SCI Management Course from Nov 2022 to Nov 2024 (Figure 2)
- Overall and topic-based confidence scores significantly increased (Figure 1)
- KBA scores increased an average of 4 ± 2.18 points ($p<0.0001$). The percentage of correct responses significantly increased for 12/20 questions (Table 1)

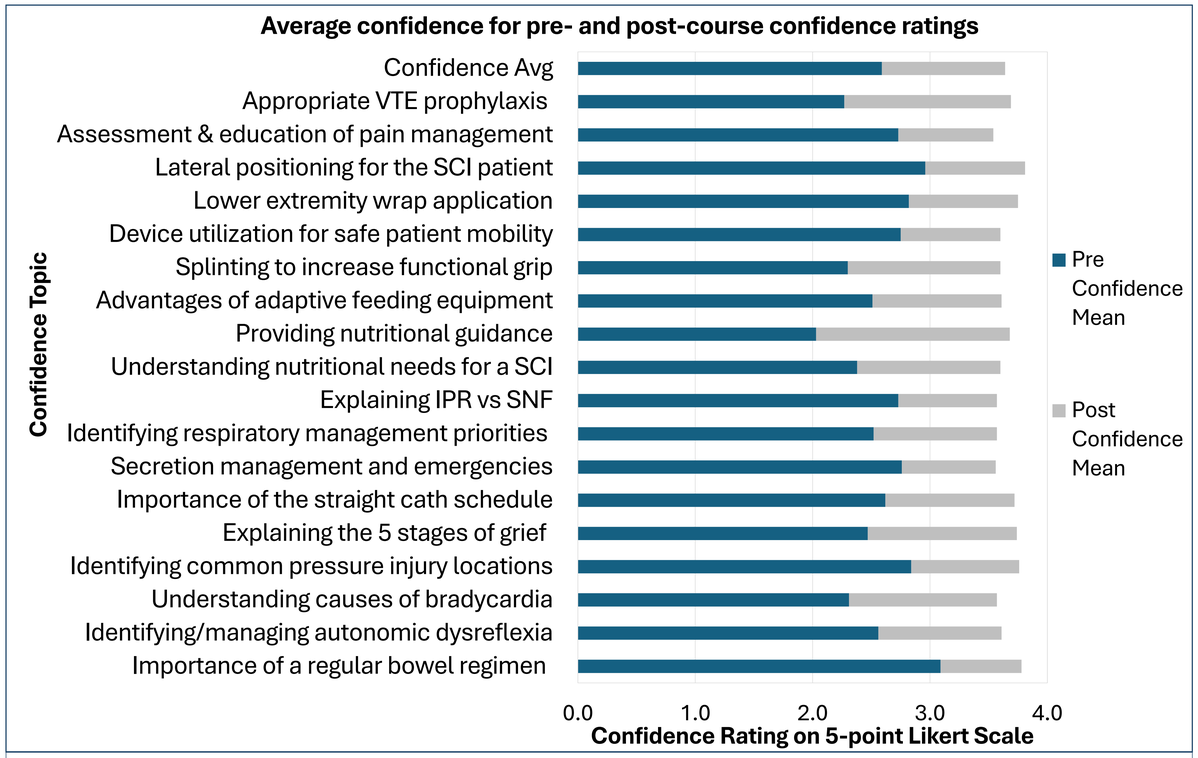

Figure 1: Average pre- and post-course confidence ratings. Confidence significantly increased ($p<0.05$) for each topic. The numerical confidence scale was assigned as: Strongly Disagree (0), Disagree (1), Neither (2), Agree (3), and Strongly Agree (4)

Knowledge-based Assessment Questionnaire	Pre % Correct	Post % Correct	p-value
The MAP for a SCI patient should be greater than __ for the first 5 days.	47.1%	97.7%	p<0.0001
VTE prophylaxis is initiated __ hours after spine surgical intervention.	25.3%	63.8%	p<0.0001
Overstretching the __ muscles negatively impacts sitting balance.	28.2%	70.1%	p<0.0001
Which therapy helps with secretion removal by applying positive and negative pressure in both ventilated and non-ventilated patients?	25.3%	50.6%	p<0.0001
The primary injury resulting in a spinal cord injury can be result of __?	84.5%	94.8%	p=0.0007
The foley catheter should be removed once the 24-hour output is < __ cc.	52.3%	84.5%	p<0.0001
Fiber-rich fruits & vegetables provide which vitamin that helps with collagen formulation, skin integrity, & protein metabolism?	43.7%	63.8%	p<0.0001
What is the pain management goal for an acute SCI patient?	73.6%	88.5%	p<0.0001
What is the most appropriate way to transfer a patient with orthostatic hypotension despite lower extremity wraps and abdominal binder?	12.1%	76.4%	p<0.0001
Which type of shock occurs with a T6 or higher SCI & has loss of sympathetic tone?	74.7%	79.3%	p<0.0001
It takes an average of __ days for an effective bowel regimen to be accomplished	36.2%	93.7%	p<0.0001
The ideal body weight for a SCI patient can decrease by __?	47.1%	70.7%	p<0.0001
When in doubt, what is the most appropriate cushion to use for a SCI?	26.4%	53.4%	p<0.0001

Table 1: Percentages of correct responses for each question with significant increase following course completion. Of the 8 questions with insignificant increases, the pre-course percentage correct ranged from 66.1% to 99.6%

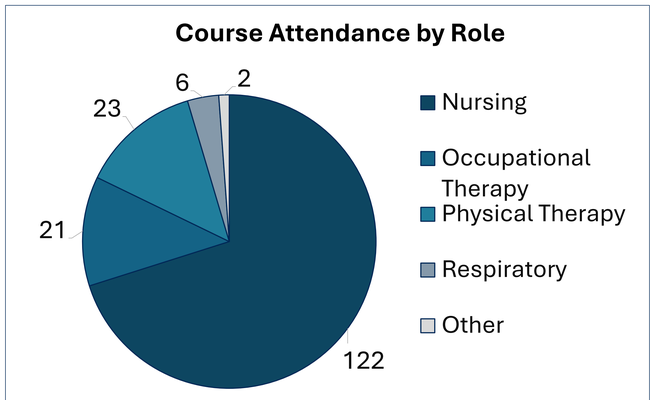

Figure 2: Distribution of specialties attending the SCI Management Course (N=174)

SCALE UP PLAN

1. Results support unit-wide implementation of the SCI Management Course to adequately train providers
2. Implementation in all units treating SCI will assist with standardizing SCI management

SUSTAINABILITY PLAN

To determine if continuing education is needed, we implemented the 6-month course follow up survey covering:

- Provider confidence
- Knowledge-based assessment
- Number of SCI patients taken care of
- Barriers to SCI management encountered
- Course benefits

If the course is implemented unit-wide, we plan to assess outcomes of SCI patients to determine if the course implementation significantly improves SCI patient care.

LESSONS LEARNED

The novel SCI Management Course was an effective educational effort to teach multidisciplinary skills to bedside providers caring for SCI patients. This comprehensive approach prepares our providers for the complexities in management of the SCI patient.

REFERENCES

Chen et al. (2020). Incidence of Pressure Injury in Individuals With Spinal Cord Injury: A Systematic Review and Meta-analysis. Journal of wound, ostomy, and continence nursing : official publication of The Wound, Ostomy and Continence Nurses Society, 47(3), 215–223.

Shang et al.(2023). Incidence and risk factors of deep vein thrombosis in patients with spinal cord injury: a systematic review with meta-analysis. Frontiers in cardiovascular medicine, 10, 1153432.

Togan, T., Azap, O. K., Durukan, E., & Arslan, H. (2014). The prevalence, etiologic agents and risk factors for urinary tract infection among spinal cord injury patients. Jundishapur journal of microbiology, 7(1), e8905.

Mueller et al. (2024). Incidence and Risk Factors of Pneumonia in Individuals With Acute Spinal Cord Injury: A Multi-national, Multi-center, Prospective Cohort Study. Archives of physical medicine and rehabilitation, 105(5), 884–891.