

## **INTERNATIONAL SPINAL CORD INJURY DATA SET CORE DATA SET**

**The Core Data Set was developed** by Michael DeVivo, Fin Biering-Sørensen, Susan Charlifue, Vanessa Noonan, Marcel Post, Thomas Stripling, Peter Wing (see DeVivo et al. International Spinal Cord Injury Core Data Set. Spinal Cord 2006). For the terminology of the International Spinal Cord Injury Data Sets cf. Biering-Sørensen et al. The International Spinal Cord Injury Data Sets. Spinal Cord 2006.

### **Acknowledgements**

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Other persons who helped draft the International Spinal Cord Injury Core Data Set were Raymond Cripps, James Harrison, Bon San Bonne Lee, Peter J. O'Connor, Renee Johnson, Lawrence C. Vogel, and Gale G. Whiteneck.

### **Organisations that have endorsed the International SCI Core Data Set as of April 1, 2006**

International Spinal Cord Society  
 American Spinal Injury Association  
 International Society for Physical and Rehabilitation Medicine  
 American Paraplegic Society  
 Paralyzed Veterans of America  
 American Academy of Physical Medicine and Rehabilitation  
 National Spinal Cord Injury Association (USA)  
 American Association of Spinal Cord Injury Psychologists and Social Workers  
 American Association of Spinal Cord Injury Nurses  
 North American Spine Society  
 Rick Hansen Man in Motion Foundation (Canada)  
 Ontario Neurotrauma Foundation (Canada)  
 International Collaboration on Repair Discoveries  
 Quadriplegic Association of South Africa  
 American Congress of Rehabilitation Medicine  
 American Association of Orthopedic Surgeons  
 Christopher Reeve Foundation (USA).

### **Using the International SCI Core Data Set**

It is advised to practice with the training cases before implementing the International Spinal Cord Injury (SCI) Core Data Set in your own setting.

Try first to fill in a blank scoring sheet (see Core Data Set Collection Form), and afterwards check with the filled in scoring-sheet to see if the scoring has been done correctly.

The documentation with explanations for the International SCI Core Data Set is found in the Introduction to the International Spinal Cord Injury Core Data Set.

**The training cases have been contributed** by Fin Biering-Sørensen, Michael J. DeVivo, Vanessa Noonan, Pradeep Thumbikat and Peter Wing.

**Questions and suggestions** regarding the International Spinal Cord Injury (SCI) Core Data Set should be directed to Vanessa Noonan [Vanessa.Noonan@vch.ca](mailto:Vanessa.Noonan@vch.ca) or Fin Biering-Sørensen [finbs@rh.dk](mailto:finbs@rh.dk).

**INTERNATIONAL SPINAL CORD INJURY DATA SET  
CORE DATA SET COLLECTION FORM**

**Dates (YYYYMMDD)**

Birth date                                    \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

Injury date                                   \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

Acute Admission                             \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

Final Inpatient Discharge                 \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

Total Days Hospitalized   \_\_\_\_\_

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Gender   \_\_\_\_\_

Injury Etiology   \_\_\_\_\_   Vertebral Injury   \_\_\_\_\_   Associated Injury   \_\_\_\_\_

Spinal Surgery   \_\_\_\_\_   Ventilatory Assistance\_\_\_\_\_   Place of Discharge   \_\_\_\_\_

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**Neurological Data**

**Acute Admission**

Date of Exam

\_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

Sensory level  
Left                    Right

\_\_\_\_\_

Motor level  
Left                   Right

\_\_\_\_\_

ASIA Impairment Scale

\_\_\_\_\_

**Final Inpatient Discharge**

Date of Exam

\_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

Sensory level  
Left                   Right

\_\_\_\_\_

Motor level  
Left                   Right

\_\_\_\_\_

ASIA Impairment Scale

\_\_\_\_\_

## **INTRODUCTION TO THE INTERNATIONAL SPINAL CORD INJURY CORE DATA SET**

The purpose of the International Spinal Cord Injury (SCI) Core Data Set is to standardize the collection and reporting of a minimal amount of information necessary to evaluate and compare results of published studies. At minimum, published studies should include information on the age of the study population at the time of injury, the current age of the study population if different from age at injury, the length of elapsed time after injury when data are being collected, the calendar time frame during which the study was conducted, the gender of the study population, the causes of spinal cord dysfunction, and the neurologic status of the study population. In addition, studies of health services and rehabilitation outcomes should also contain information on the total number of days hospitalized, whether a vertebral injury was present, whether spinal surgery was performed, whether associated injuries were present, whether patients were ventilator-dependent, and the place of discharge from inpatient care. Inclusion of more detailed information will depend on the research topic.

It is extremely important that data be collected in a uniform manner. For this reason, each variable and each response category within each variable have been specifically defined in a way that is designed to promote the collection and reporting of comparable minimal data.

Use of a standard coding scheme (assignment of numeric values to response categories) and format is essential for combining data from multiple investigators and locations. Therefore, all response categories within each variable have been assigned codes that can be used consistently at all locations. However, other formats and coding schemes may be equally effective and could be used in individual studies or by agreement of the collaborating investigators.

Additional modules of the SCI International Data Set will be developed by panels of experts in each area of research. These modules will identify the most critical variables for specific topics of research and provide recommended standards for collecting and reporting of that information.

VARIABLE NAME: Date of Birth  
 DESCRIPTION: This variable documents the patient's date of birth.  
 LENGTH: 8  
 FORMAT: Numeric (yyyymmdd)  
 CODES: 9999-99-99 Unknown  
 COMMENTS: Record the year, month, and day of birth. If the month or day is unknown, it should be coded "99"; if the year is unknown, it should be coded "9999".

Numeric format is used rather than date format for computer storage of the data because the unknown codes are not valid dates.

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VARIABLE NAME: Date of Injury  
 DESCRIPTION: This variable specifies the date the spinal cord injury occurred.  
 LENGTH: 8  
 FORMAT: Numeric (yyyymmdd)  
 CODES: 9999-99-99 Unknown  
 COMMENTS: Record the year, month, and day of injury. If the month or day is unknown, it should be coded "99"; if the year is unknown, it should be coded "9999".

Numeric format is used rather than date format for computer storage of the data because the unknown codes are not valid dates.

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VARIABLE NAME: Date of Acute Care Hospital Admission  
 DESCRIPTION: This variable specifies the date of admission to the first acute care hospital after the spinal cord injury occurred.  
 LENGTH: 8  
 FORMAT: Numeric (yyyymmdd)  
 CODES: 9999-99-99 Unknown  
 COMMENTS: Record the year, month, and day of first acute care hospital admission. If the month or day is unknown, it should be coded "99"; if the year is unknown, it should be coded "9999".

Numeric format is used rather than date format for computer storage of the data because the unknown codes are not valid dates.

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VARIABLE NAME: Date of Final Inpatient Discharge  
DESCRIPTION: This variable specifies the date of discharge from the last inpatient hospital when all planned acute care and rehabilitation phases of treatment are completed.  
LENGTH: 8  
FORMAT: Numeric (yyyymmdd)  
CODES: 9999-99-99 Unknown  
COMMENTS: Record the year, month, and day of discharge from the last inpatient hospital when all planned acute care and rehabilitation phases of treatment are completed. If the month or day is unknown, it should be coded "99"; if the year is unknown, it should be coded "9999".

Numeric format is used rather than date format for computer storage of the data because the unknown codes are not valid dates.

On this date, patients will typically be discharged home (with no further planned inpatient admissions) or discharged to a long-term care facility. Outpatient rehabilitation or a home rehabilitation program may continue after this date, or limited rehabilitation therapy may continue in the long-term care facility. If the patient dies during inpatient hospitalization, this will be the date of death.

If there is a planned interruption in the inpatient hospitalization and the patient is readmitted for further care, then the date of inpatient discharge is the date of discharge for the planned readmission. An example of this would be a patient who is discharged home temporarily until he is ready for further rehabilitation and then is brought back to the hospital for completion of inpatient rehabilitation. The date of inpatient discharge is the last date of discharge with no further planned hospitalizations. Subsequent admissions and discharges for treatment of unplanned secondary medical complications such as infections or pressure sores are not to be coded in this variable.

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VARIABLE NAME: Total Days Hospitalized for Acute Care and Rehabilitation  
DESCRIPTION: This variable specifies the total number of days spent in the hospital from the date of injury until discharge from the last inpatient treatment phase (the date of inpatient discharge).  
LENGTH: 4  
FORMAT: Numeric  
CODES: 9999 Unknown  
COMMENTS: Do not count days when the patient is temporarily discharged pending readmission

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VARIABLE NAME: Gender  
DESCRIPTION: This variable specifies the gender of the patient.  
LENGTH: 1  
FORMAT: Numeric  
CODES: 1 Male  
2 Female  
9 Unknown

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VARIABLE NAME: Spinal Cord Injury Etiology

DESCRIPTION: This variable identifies the etiology of the spinal cord injury. Traumatic spinal cord injury is impairment of the spinal cord or cauda equina function resulting from the application of an external force of any magnitude.

LENGTH: 1

FORMAT: Numeric

1. Sports
2. Assault
3. Transport
4. Fall
5. Other traumatic cause
6. Non-traumatic spinal cord dysfunction
9. Unspecified or Unknown

COMMENTS: This variable is adapted from the International Classification of External Causes of Injuries (ICECI). In its entirety, the ICECI provides a multi-axial description of the event that resulted in spinal cord injury. Four axes have been developed, including the External Cause of Injury Axis, the Intent of Injury Axis, the Place of Injury Axis, and the Injury Activity Axis. Use of the complete version of the ICECI (including all four axes and subcategories not included in the core data set) is recommended for injury surveillance activities or other research studies the goal of which would be to provide information useful for the development of interventions targeted at primary prevention of spinal cord injuries.

Because it is possible that an injury event may be classifiable into more than one of these categories, the following prioritization has been established for assigning codes:

First coding priority is given to sports. If the injury event involved sports it should be coded as a 1 (Sports) regardless of whether it involved assault, transport or a fall. Code 1 would be appropriate whenever the ICECI Injury Activity Axis would be coded as "sports and exercise during leisure time" (ICECI Injury Activity code 4) regardless of coding on other ICECI Axes.

VARIABLE NAME: Spinal Cord Injury Etiology (continued)

Second priority is given to Assault. If the event did not involve sports but it did involve an assault, then the event should be coded as a 2 (Assault) regardless of whether it involved transport or a fall. Code 2 would be appropriate whenever the ICECI Intent of Injury Axis would be coded as “assault” (ICECI Intent of Injury code 3) and the ICECI Injury Activity Axis would not be coded as “sports and exercise during leisure time” (ICECI Injury Activity code 4) regardless of other ICECI Axes.

Third priority is given to Transport. If the event was neither sports nor assault related but it involved transport, then the event should be coded as 3 (Transport) regardless of whether it involved a fall. Code 3 would be appropriate whenever the ICECI External Cause of Injury Axis would be coded as “transport injury event” (ICECI External Cause of Injury code 1.1) and ICECI Intent of Injury Axis would not be coded as “assault” (ICECI Intent of Injury code 3) and ICECI Injury Activity Axis would not be coded as “sports and exercise during leisure time” (ICECI Injury Activity code 4).

Fourth priority is given to Fall. If the event was neither sports, assault nor transport related and it involved a fall then it should be coded as 4 (Fall). Code 4 would be appropriate whenever the ICECI External Cause of Injury Axis would be coded as “falling, stumbling, or jumping” (ICECI External Cause of Injury code 1.5) and ICECI Intent of Injury Axis would not be coded as “assault” (ICECI Intent of Injury code 3) and ICECI Injury Activity Axis would not be coded as “sports and exercise during leisure time” (ICECI Injury Activity code 4).

Use code 5 (other traumatic cause) for all other known (specified) traumatic causes whenever codes 1 through 4 of this etiology variable do not apply. Paralysis secondary to surgical procedures when the patient does not have a neurological deficit prior to surgery would be coded in this category.

Use code 6 (non-traumatic cause) if there is impairment of the spinal cord or cauda equina function that is not caused either directly or indirectly by an external event.

VARIABLE NAME: Vertebral Injury  
DESCRIPTION: This variable documents whether there was a spinal fracture and/or dislocation in addition to the spinal cord injury.  
LENGTH: 1  
FORMAT: Numeric  
CODES: 0 No  
1 Yes  
9 Unknown  
COMMENTS: Spinal fracture or dislocation is defined as any break, rupture, or crack through or between any part(s) of the vertebral column from the occiput to the coccyx.

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VARIABLE NAME: Associated Injury  
DESCRIPTION: This variable documents whether any of the following pre-specified major injuries occurred at the same time as the spinal cord injury: moderate to severe traumatic brain injury (Glasgow Coma Scale 12 or below at discharge), non-vertebral fractures requiring surgery, severe facial injuries affecting sense organs, major chest injury requiring chest-tube or mechanical ventilation, traumatic amputations of an arm or leg (or injuries severe enough to require surgical amputation), severe hemorrhaging, or damage to any internal organ requiring surgery.  
LENGTH: 1  
FORMAT: Numeric  
CODES: 0 No  
1 Yes  
9 Unknown  
COMMENTS: Do not include other associated injuries not listed above, negative findings from exploratory surgery, and do not include injuries that pre-date the spinal cord injury.

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VARIABLE NAME: Spinal Surgery

DESCRIPTION: This variable documents whether any of the following spinal surgical procedures were performed during the inpatient hospitalization following spinal cord injury: laminectomy, neural canal restoration, reduction, spinal fusion, or internal fixation of the spine.

LENGTH: 1

FORMAT: Numeric

CODES: 0 No

1 Yes

9 Unknown

COMMENTS: Laminectomy is defined as removal of normal intact lamina or foreign body at the site of spinal cord damage.

Neural canal restoration is defined as the removal of bone or disk fragments, blood clots, or foreign bodies (such as bullet fragments) from the spinal canal.

Reduction is defined as replacement of one or more dislocated, subluxed or angulated vertebra into anatomic or near anatomic alignment.

Spinal fusion is defined as the addition of a bone graft to the vertebrae for the purpose of achieving intervertebral fusion or stability.

Internal fixation of the spine is defined as attaching rods, plates, wires, etc. to the spine (individually or in combination) to provide internal surgical stabilization of the vertebral column.

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VARIABLE NAME: Utilization of Ventilatory Assistance

DESCRIPTION: This variable documents any use of any type of ventilatory assistance used to sustain respiration on the date of final inpatient discharge (the date of discharge from the last inpatient rehabilitation hospital or discharge from the last acute care hospital if the patient is not admitted to a rehabilitation hospital).

LENGTH: 1

FORMAT: Numeric

CODES: 0 No  
1 Yes, less than 24 hours per day at discharge  
2 Yes, 24 hours per day at discharge  
3 Yes, unknown number of hours per day at discharge  
9 Unknown

COMMENTS: Ventilatory assistance includes but is not limited to mechanical ventilators, phrenic nerve stimulators, external negative pressure devices, and BiPAP. Do not include routine administration of oxygen; periodic IPPB administration; or CPAP.

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VARIABLE NAME: Place of Discharge

DESCRIPTION: This variable specifies the discharge disposition of the patient.

LENGTH: 2

FORMAT: Numeric

CODES:

- 01 Private residence: includes house, condominium, mobile home, apartment, or houseboat
- 02 Hospital: includes mental hospital or other acute care hospital for management of continuing medical issues after spinal cord injury-related care and/or rehabilitation is completed
- 03 Nursing home: includes skilled nursing facilities and institutions providing essentially long-term, custodial, chronic disease care
- 04 Assisted living residence: includes residential non-institutional locations in which some level of support for activities of daily living is provided
- 05 Group living situation: includes transitional living facility or any residence shared by non-family members
- 06 Correctional institution: includes prison, penitentiary, jail, correctional center, etc.
- 07 Hotel or motel
- 08 Homeless: includes cave, car, tent, etc.
- 09 Deceased
- 10 Other, unclassified
- 99 Unknown

COMMENTS: If the patient's place of residence does not fit into any of the above classifications, document it as "other, unclassified".

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VARIABLE NAME: Dates of the Neurologic Examinations

DESCRIPTION: These variables document the dates on which the neurologic examinations were performed:

- 1) at initial acute care hospital examination
- 2) at discharge from the last inpatient hospital

LENGTH: 8 for each entry

FORMAT: Numeric (yyyymmdd)

CODES: Any valid date

8888-88-88 Not Done

9999-99-99 Unknown

COMMENTS: Record the year, month, and day. If the month or day is unknown, it should be coded "99"; if the year is unknown, it should be coded "9999".

Use the unknown code ("9999-99-99") when it is not known if there was a neurologic exam.

Date format is not used because the unknown and not done codes are not valid dates.

When parts of the exam are done on different dates, the date of the exam should be the day on which most parts of the exam were done.

All exams should be performed within 72 hours of the corresponding admission or discharge date; however, data for exams performed later than 72 hours after admission or more than 72 hours before discharge can be included in the database.

The complete neurologic exam consists of the sensory and motor levels and the ASIA Impairment Scale. This exam must be performed by a physician or a designated person who has been trained using the ASIA guidelines.

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VARIABLE NAME: Sensory Level

DESCRIPTION: The sensory level (which may differ by side of body) is the most caudal segment of the spinal cord with normal sensory function for pinprick and light touch on both sides of the body. Right and left levels are documented separately

- 1) at initial acute care hospital examination
- 2) at discharge from the last inpatient hospital

LENGTH: 3 for each entry

FORMAT: Character

|       |         |                             |
|-------|---------|-----------------------------|
| CODES | C01-C08 | Cervical (C1 - C8)          |
|       | T01-T12 | Thoracic (Dorsal, T1 - T12) |
|       | L01-L05 | Lumbar (L1 - L5)            |
|       | S01-S05 | Sacral (S1 - S5)            |
|       | X00     | Normal neurologic exam      |
|       | X99     | Unknown or Not Done         |

COMMENTS: If only the alphabetic part of the level is known, it is permissible to use code C, L, T, or S followed by numeric code "99". Use code X99 if the level is completely unknown, the exam was not done, or there was no corresponding admission or discharge.

SOURCE: Refer to the latest published version of [The International Standards for Neurological Classification of Spinal Cord Injury](#) for complete information on the sensory examination and a listing of all key points.

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VARIABLE NAME: Motor Level

DESCRIPTION: The motor level (the lowest normal motor segment - which may differ by side of body) is defined by the lowest key muscle that has a grade of at least 3, provided the key muscles represented by segments above that level are judged to be normal (grade 5). Right and left levels are documented separately

- 1) at initial acute care hospital examination
- 2) at discharge from the last inpatient hospital

LENGTH: 3 for each entry

FORMAT: Character

CODES: C01-C08 Cervical (C1 - C8)  
 T01-T12 Thoracic (Dorsal, T1 - T12)  
 L01-L05 Lumbar (L1 - L5)  
 S01-S05 Sacral (S1 - S5)  
 X00 Normal  
 X99 Unknown or Not Done

COMMENTS: The examiner's judgment is relied upon to determine whether a muscle that tests as less than normal (grade 5) may in fact be fully innervated. This may occur when full effort from the patient is inhibited by factors such as pain, positioning and hypertonicity or when weakness is judged to be due to disuse. If any of these or other factors impeded standardized muscle testing, the muscle should be graded as *not testable*. However, if these factors do not prevent the patient from performing a forceful contraction and the examiner's best judgment is that the muscle would test normally (grade 5) were it not for these factors, it may be graded as 5. For those myotomes that are not clinically testable by a manual muscle exam (i.e., C1 to C4, T2 to L1 and S2 to S5), the motor level is presumed to be the same as the sensory level.

If only the alphabetic part of the level is known, it is permissible to use code C, L, T, or S followed by numeric code "99". Use code X99 if the level is completely unknown, the exam was not done, or there was no corresponding admission or discharge.

SOURCE: Refer to the latest published version of the International Standards for Neurological Classification of Spinal Cord Injury for complete information on the motor examination and a listing of all key muscles.

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VARIABLE NAME: ASIA Impairment Scale (modified from Frankel)

DESCRIPTION: This variable attempts to quantitate the degree of impairment  
 1) at initial acute care hospital examination  
 2) at discharge from the last inpatient hospital

LENGTH: 1 for each entry

FORMAT: Character

CODES: A Complete Injury.  
 No sensory or motor function is preserved in the sacral segments S4-S5.  
 B Incomplete.  
 Sensory but not motor function is preserved below the neurological level and includes the sacral segments S4-S5.  
 C Incomplete.  
 Motor function is preserved below the neurological level, and more than half of the key muscles below the neurological level have a muscle grade less than 3.  
 D Incomplete.  
 Motor function is preserved below the neurological level, and at least half of key muscles below the neurological level have a muscle grade greater than or equal to 3.  
 E Normal.  
 Sensory and motor function are normal.  
 U Unknown or not applicable.

COMMENTS: When an associated injury (e.g., traumatic brain injury) or certain non-neurologic impairments interfere with the performance of a complete neurological examination, the ASIA Impairment Scale should be coded Unknown.

For an individual to receive a grade of B, C, or D, he/she must be incomplete, that is, have sensory or motor function in the sacral segments S4-S5. Any sensation felt in the anal area during this part of the exam signifies that the patient is sensory incomplete (at least grade B). In addition, for an individual to receive a grade of C or D, the individual must have either (1) voluntary anal sphincter contraction or (2) sparing of motor function more than three levels below the motor level.

SOURCE: Refer to the latest published version of the International Standards for Neurological Classification of Spinal Cord Injury.

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## **CASES FOR TRAINING OF THE INTERNATIONAL SPINAL CORD INJURY CORE DATA SET**

### **1. CASE FOR CORE DATA SET TRAINING**

A man who was born on February 23, 1920, was admitted to the orthopaedic surgical department on May 2, 2005, after a traffic accident the same day. The man was a passenger in his son's car when it was hit by a truck from behind.

Immediately after the traffic accident, the man was found to have paralysis of all four extremities. In addition, he had a fracture of his left femur. On the day of hospital admission, a CT-scan showed a fracture of the 6<sup>th</sup> cervical vertebral body without dislocation or bony fragments in the spinal canal. At a neurological examination performed the following day according to the International Neurological Standards for Spinal Cord Injuries, he was found to have a complete spinal cord injury with a sensory level corresponding to C5 on the left and C4 on the right, whereas muscle strength testing showed normal force for elbow flexion on both sides but only strength 3 for the wrist extensors on both sides, and nothing below this level. Due to respiratory failure, he was intubated and put on a ventilator on the day of admission.

On May 4, 2005, he had a spinal fixation performed from the C5 to C7 vertebra. During the same anaesthesia, he also had an internal fixation of his left femur.

On May 7, 2005, he was taken off the ventilator and transferred to the rehabilitation department. On July 1, 2005 before completing his rehabilitation program, he was discharged for personal reasons for a short period until being readmitted on July 15, 2005. From that time, he remained hospitalized until he was finally discharged to a nursing-home on September 5, 2005. He was examined on the day of discharge, and was still found to have a complete spinal cord injury with a sensory level corresponding to C6 on the left and C5 on the right. Muscle strength testing showed normal strength 5 for elbow flexion on both sides, and muscle power of 4 and 3 for the wrist extensors on the right and left sides, respectively. There was also muscle strength of 2 on the right and 1 on the left for elbow extension.

**CORE DATA SET****Dates (YYYYMMDD)**

Birth date 1920 / 02 / 23  
 Injury date 2005 / 05 / 02  
 Acute Admission 2005 / 05 / 02  
 Final Inpatient Discharge 2005 / 09 / 05  
 Total Days Hospitalized 112

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Gender \_1\_

Injury Etiology \_3\_ Vertebral Injury \_1\_ Associated Injury \_1\_

Spinal Surgery \_1\_ Ventilatory Assistance \_0\_ Place of Discharge \_03\_

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**Neurological Data****Acute Admission**

Date of Exam  
2005 / 05 / 03

## Sensory level

|      |       |
|------|-------|
| Left | Right |
| C5   | C4    |

## Motor level

|      |       |
|------|-------|
| Left | Right |
| C6   | C6    |

**ASIA IMPAIRMENT SCALE****A****Final Inpatient Discharge**

Date of Exam  
2005 / 09 / 05

## Sensory level

|      |       |
|------|-------|
| Left | Right |
| C6   | C5    |

## Motor level

|      |       |
|------|-------|
| Left | Right |
| C6   | C6    |

**ASIA IMPAIRMENT SCALE****A**

## **2. CASE FOR CORE DATA SET TRAINING**

On 2004/02/22, Mr. Jones, a 24 year old man (born 1980/02/15) fell off his horse while riding on his farm. A riding companion called paramedics to the scene, where they discovered that Mr. Jones was having difficulty breathing and was unable to move any extremities. Glasgow Coma Score was 13, indicating a mild head injury. He was intubated at the scene and was taken by ambulance to the Acute Spinal Cord Unit where he was admitted later that afternoon. The initial neurological examination performed in the emergency room based on the International Neurological Standards for Spinal Cord Injuries revealed grade 3 muscle strength of his biceps bilaterally with no other motor function below the biceps, and no anal contraction. Sensation was normal to light touch and pin prick to C3 on the right, and C4 on the left, impaired to C6 bilaterally, and absent below. A CT-scan revealed an unstable C4 fracture, and Mr. Jones was taken to the operating room where a cervical fusion was performed. Mr. Jones tolerated the procedure well and remained in the surgical intensive care unit (SICU) until 2004/03/05 when he was transferred to a non-SICU acute care bed. During his stay in the SICU, Mr. Jones was successfully weaned from the ventilator and extubated.

On 2004 /03 /10, he was transferred to the rehabilitation unit. A neurological examination completed on that day revealed grade 4 muscle strength of the biceps, grade 3 muscle strength of the wrist extensors, and nothing below on the left. On the right, biceps were grade 3 and wrist extensors were grade 2 with nothing below. His sensation was normal to both light touch and pin prick to C5, impaired at C6, and absent below bilaterally.

On 2004/03/15, Mr. Jones was again experiencing respiratory difficulty. Mr. Jones was placed on oxygen. Chest x-ray revealed bilateral pneumonia. Blood and sputum cultures revealed both klebsiella and pseudomonas. Mr. Jones was transferred back to the acute care unit and given IV antibiotics. His condition continued to deteriorate and he died at 3:15AM on 2004/03/16. The family declined an autopsy.

## CORE DATA SET

### Dates (YYYYMMDD)

|                           |                |
|---------------------------|----------------|
| Birth date                | 1980 / 02 / 15 |
| Injury date               | 2004 / 02 / 22 |
| Acute Admission           | 2004 / 02 / 22 |
| Final Inpatient Discharge | 2004 / 03 / 16 |
| Total Days Hospitalized   | 23             |

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Gender        \_1\_

Injury Etiology \_1\_    Vertebral Injury \_1\_        Associated Injury \_0\_

Spinal Surgery \_1\_    Ventilatory Assistance \_0\_    Place of Discharge \_09\_

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### Neurological Data

#### Acute Admission

Date of Exam  
2004 / 02 / 22

Sensory level  
Left            Right  
C4              C3

Motor level  
Left            Right  
C5              C3

#### ASIA IMPAIRMENT SCALE

A

#### Final Inpatient Discharge

Date of Exam  
2004 / 03 / 10

Sensory level  
Left            Right  
C5              C5

Motor level  
Left            Right  
C5              C5

#### ASIA IMPAIRMENT SCALE

A

### 3. CASE FOR CORE DATA SET TRAINING

A 43 year old female (born 1961/05/15) was injured in a mountain biking accident on 2005/02/22. Her bike hit a log and she was thrown over the handlebars landing on her head. At the accident scene, the paramedics discovered that she was unable to move her lower extremities and had weakness in her upper extremities, with no other major injuries. She was taken by air ambulance to the Acute Spinal Cord Unit and was admitted later that afternoon. Ventilatory assistance was not required. On emergency room admission, the neurological examination based on the International Neurological Standards for Spinal Cord Injuries was performed. The motor exam revealed grade 5 muscle strength of her biceps and wrist extensors bilaterally, grade 4 and grade 3 muscle strength of her triceps on the left and right, respectively, and grade 3 and grade 1 muscle strength of her middle finger flexors on the left and right, respectively, with no other motor function below C8 including no anal contraction. Sensation was normal to light touch and pin prick to C8 on the left and C7 on the right, it was impaired from T1 to T8 on the left and C8 to T8 on the right and absent below T8 bilaterally, except that sensation of the sacral segments (i.e. S4-S5) was present but impaired. A CT-scan indicated that she had a C7 burst fracture with no other injuries. On 2005/02/23, an anterior vertebrectomy and fusion with a cage was performed at the level of C7.

On 2005 /03 /03, she was transferred to the rehabilitation unit, and was subsequently discharged home on 2005 /04 /20. A neurological examination was completed on the day of her discharge. She had grade 5 muscle strength through her triceps bilaterally, grade 5 and grade 3 muscle strength of her middle finger flexors on the left and right side respectively, and grade 3 and grade 1 muscle strength of her small finger abductors on the left and right side respectively with no other motor function below this level. Her sensation was normal to both light touch and pin prick to T1 and C8 on the left and right side respectively, it was impaired between T2 and T10 on the left and T1 to T10 on the right and absent below T10 bilaterally, except that she had present but impaired sensation in the sacral segments (i.e. S4-S5).

## CORE DATA SET

### Dates (YYYYMMDD)

|                           |                |
|---------------------------|----------------|
| Birth date                | 1961 / 05 / 15 |
| Injury date               | 2005 / 02 / 22 |
| Acute Admission           | 2005 / 02 / 22 |
| Final Inpatient Discharge | 2005 / 04 / 20 |
| Total Days Hospitalized   | 57             |

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Gender      \_2\_

Injury Etiology \_1\_    Vertebral Injury \_1\_      Associated Injury \_0\_

Spinal Surgery \_1\_    Ventilatory Assistance \_0\_    Place of Discharge \_01\_

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### Neurological Data

#### Acute Admission

Date of Exam  
2005 / 02 / 22

Sensory level  
Left            Right  
C8              C7

Motor level  
Left            Right  
C7              C7

**ASIA IMPAIRMENT SCALE**

**B**

#### Final Inpatient Discharge

Date of Exam  
2005 / 04 / 20

Sensory level  
Left            Right  
T1              C8

Motor level  
Left            Right  
T1              C8

**ASIA IMPAIRMENT SCALE**

**B**

#### 4. CASE FOR CORE DATA SET TRAINING

On the afternoon of the 16<sup>th</sup> of August, 2005, a 64 year old gentleman (born on July 15, 1941) slipped and fell down a flight of 13 steps hitting his forehead and coming to rest at the bottom of the stairs. He did not lose consciousness, but noticed that he was unable to move his limbs. He also recollects that he experienced a sharp pain radiating from the neck into his arms during the fall following which he was unable to feel very much below his chest. He was retrieved from the site of the fall by an ambulance crew using standard spinal precautions, and admitted to the hospital later that day. Initial standard radiographs did not show any evidence of bony injury or displacement. Subsequent CT and MRI scans revealed a stenotic cervical spinal canal at the C4 to C6 levels with evidence of ligamentous injury at the C5/C6 level (ALL disruption, associated hematoma). The spinal cord at the latter level showed a bright signal change on a T2 weighted MR scan suggesting cord injury and swelling at that level. The neurological examination based on the International Standards for Spinal Cord Injuries performed the next day indicated sensory levels of C6 on the right and C7 on the left. Sensory sparing to pin prick and touch was observed bilaterally in the sacral dermatomes. Motor examination revealed grade 5 power in the biceps and wrist extensors bilaterally and grade 4 in the triceps on the left. Triceps on the right side had grade 2 power, and all the other key muscles in the upper limbs showed no activity. No motor activity was observed in the muscles of the lower limbs on both sides except a flicker in the extensor hallucis longus on the left. In view of this man's pre-existing medical problems (ischemic heart disease, severe asthma) and relative stability of the cervical vertebral column, a decision was made to treat him non-surgically. He did not require any ventilatory support and did not suffer any other injuries in the accident.

On August 19<sup>th</sup>, 2005, he was transferred to the rehabilitation center, where he remained an inpatient until November 10<sup>th</sup>, 2005. He made significant neurological and functional recovery during the period leading up to his discharge home. Sensory levels determined the day before discharge was T2 on

the right and T5 on the left, below which touch and pin prick were abnormal. Motor examination demonstrated the following muscle power grades:

|                       | Right | Left |
|-----------------------|-------|------|
| Biceps                | 5     | 5    |
| Wrist extensors       | 5     | 5    |
| Triceps               | 4     | 4    |
| Finger flexor         | 2     | 2    |
| Intrinsics            | 2     | 2    |
| Hip flexors           | 3     | 4    |
| Knee extensors        | 3     | 3    |
| Ankle DF              | 3     | 3    |
| EHL                   | 4     | 4    |
| Ankle plantar flexors | 4     | 4    |

He was able to walk with the help of a frame and had regained a degree of bladder control.

**CORE DATA SET****Dates (YYYYMMDD)**

Birth date 1941 / 07 / 15  
 Injury date 2005 / 08 / 16  
 Acute Admission 2005 / 08 / 16  
 Final Inpatient Discharge 2005 / 11 / 10  
 Total Days Hospitalized 86

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Gender \_1\_

Injury Etiology \_4\_ Vertebral Injury \_0\_ Associated Injury \_0\_

Spinal Surgery \_0\_ Ventilatory Assistance \_0\_ Place of Discharge \_01\_

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**Neurological Data****Acute Admission**

Date of Exam  
2005 / 08 / 17

## Sensory level

|      |       |
|------|-------|
| Left | Right |
| C7   | C6    |

## Motor level

|      |       |
|------|-------|
| Left | Right |
| C7   | C6    |

**ASIA IMPAIRMENT SCALE****C****Final Inpatient Discharge**

Date of Exam  
2005 / 11 / 09

## Sensory level

|      |       |
|------|-------|
| Left | Right |
| T5   | T2    |

## Motor level

|      |       |
|------|-------|
| Left | Right |
| C7   | C7    |

**ASIA IMPAIRMENT SCALE****D**

## 5. CASE FOR CORE DATA SET TRAINING

On January 2, 2005, Mr. Smith, a 35 year old dentist and mountain biking enthusiast (date of birth May 10, 1969), lost control of his mountain bike while coming down a steep gradient and hit an embankment, which resulted in him being thrown from the cycle. He landed on his buttocks and transiently lost consciousness. He was retrieved from the scene and transferred to a nearby hospital using appropriate spinal precautions. Fit, healthy, and an outdoor enthusiast, he did not have a history of significant past medical problems. He remembers waking up in an ambulance and being unable to use his legs.

Initial examination at the receiving hospital revealed absence of motor power and sensory awareness in the legs which was subsequently confirmed on radiographs and CT scans to be related to an L2 fracture (flexion distraction). He had also sustained an ankle fracture, but there was no evidence of a significant brain injury.

Later in the afternoon on the day of injury, he was transferred to the regional tertiary spine unit, where the next day he underwent surgical stabilization and fusion of the vertebral fracture using a posterior approach. MR scans done prior to surgery showed signal changes in spinal cord at the affected levels consistent with injury and swelling. At the same sitting, the ankle injury was also reduced and internally fixed.

The initial neurological examination at the spine unit based on the International Standards for Spinal Cord Injuries, done on the day of admission, indicated sensory levels of T11 on the right and T12 on the left. It was also determined that no motor activity was present in any of the key muscles in the lower limbs, deep tendon jerks in the lower limbs (knee and ankle jerks) were absent, the plantar response was equivocal, there was no anal tone, that he was unable to produce a voluntary anal squeeze, and that the bulbocavernous reflex was absent. Neurological examination of the cranial nerves and upper limbs did not reveal any deficits.

The post-operative period passed uneventfully and he made a quick recovery. He began to mobilize in a wheelchair about 4 days following surgery, and went on to quickly learn the required physical skills. He was transferred to the spinal injuries rehabilitation center on January 9, 2005, where he stayed an inpatient until discharge to his house on March 18, 2005, facilitated earlier than planned at his request for personal reasons. No difficulties were encountered during his stay at the spinal injuries center. At the time of discharge, he was able to stand and walk with the help of ankle-foot orthoses and a walking frame. The bladder management was by intermittent self-catheterizations, which was largely reliable except on the few occasions when he had dribbled with coughing. The last inpatient neurological examination documented was carried out on the day before discharge, and had the following results:

**Higher Functions** – Normal

**Cranial Nerves** - Normal

|                            | Right | Left |
|----------------------------|-------|------|
| <b>Sensory Examination</b> |       |      |
| Pin prick (last normal)    | L3    | L2   |
| Touch (last normal)        | L5    | L5   |
| <b>Motor Examination</b>   |       |      |
| Biceps                     | 5     | 5    |
| Wrist extensors            | 5     | 5    |
| Triceps                    | 5     | 5    |
| Finger flexor              | 5     | 5    |
| Intrinsics                 | 5     | 5    |
| Hip flexors                | 4     | 4    |
| Knee extensors             | 4     | 4    |

|                       |           |           |
|-----------------------|-----------|-----------|
| Ankle DF              | 3         | 0         |
| EHL                   | 3         | 0         |
| Ankle plantar flexors | 0         | 0         |
| <b>Reflexes</b>       |           |           |
| Biceps                | Normal    | Normal    |
| Supinator             | Normal    | Normal    |
| Triceps               | Normal    | Normal    |
| Knee                  | Absent    | Absent    |
| Ankle                 | Absent    | Absent    |
| Plantar               | Equivocal | Equivocal |
| Anal tone and squeeze | Absent    | Absent    |

**CORE DATA SET****Dates (YYYYMMDD)**

Birth date 1969 / 05 / 10  
 Injury date 2005 / 01 / 02  
 Acute Admission 2005 / 01 / 02  
 Final Inpatient Discharge 2005 / 03 / 18  
 Total Days Hospitalized 75

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Gender \_1\_  
 Injury Etiology \_1\_ Vertebral Injury \_1\_ Associated Injury \_1\_  
 Spinal Surgery \_1\_ Ventilatory Assistance \_0\_ Place of Discharge \_01\_

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**Neurological Data****Acute Admission**

Date of Exam  
 2005 / 01 / 02

## Sensory level

|      |       |
|------|-------|
| Left | Right |
| T12  | T11   |

## Motor level

|      |       |
|------|-------|
| Left | Right |
| T12  | T11   |

**ASIA IMPAIRMENT SCALE****A****Final Inpatient Discharge**

Date of Exam  
 2005 / 03 / 17

## Sensory level

|      |       |
|------|-------|
| Left | Right |
| L2   | L3    |

## Motor level

|      |       |
|------|-------|
| Left | Right |
| L2   | L2    |

**ASIA IMPAIRMENT SCALE****A**