

[Toolkit For]

Neurology Assessment



Rick Hansen Institute
Institut Rick Hansen

International Standard for Neurological Classification of
Spinal Cord Injury (ISNCSCI) Assessment:
Rationale and Tips for Completion.

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TOOLKIT FOR NEUROLOGY ASSESSMENT

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BACKGROUND

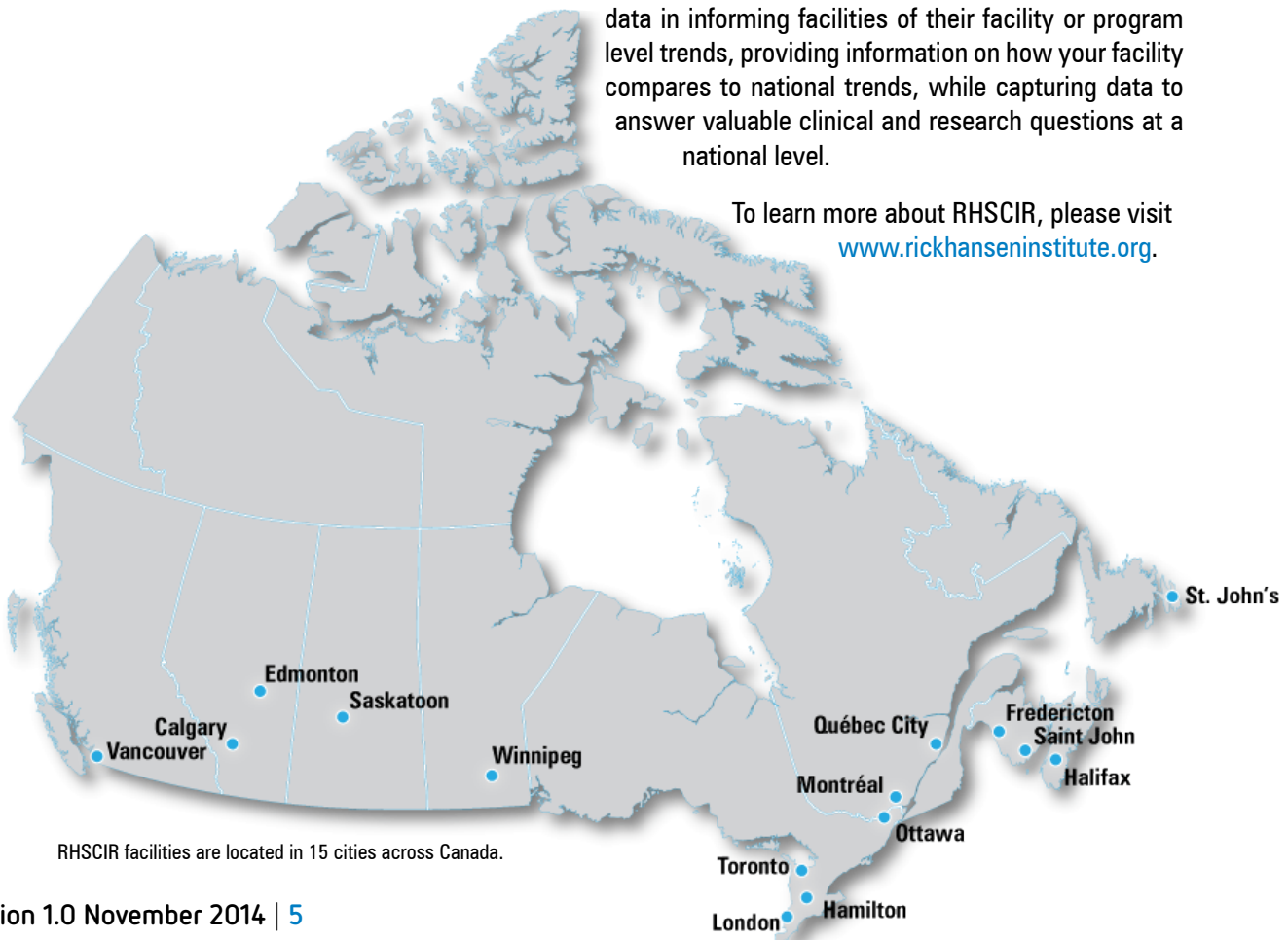
About RHSCIR

The **RICK HANSEN SPINAL CORD INJURY REGISTRY (RHSCIR)** is a pan-Canadian prospective observational registry located at 31 major Canadian acute care and rehabilitation facilities. Across Canada, RHSCIR is collecting comprehensive SCI data for the purpose of improving spinal cord injury (SCI) care and clinical outcomes. Using standardized research protocols and data collection forms, RHSCIR tracks the experiences and outcomes of people with traumatic SCI during their journey from acute care to rehabilitation to community reintegration. Details about participants' spinal cord injuries including extent of injury and level of paralysis, recovery, and success of various treatments are among the data recorded.

The data collected in RHSCIR contains powerful information that will help track the effectiveness of specific treatments, practices or programs for improving functional outcomes and quality of life after SCI. RHSCIR promotes, encourages and supports the pursuit of excellence in all areas of SCI health care management.

This network of 31 facilities has a goal of standardizing the collection of neurology data at admission to acute care, admission to rehabilitation care and discharge to community in people who have sustained a spinal cord injury. This minimum amount of standardized neurological assessment information will be added to RHSCIR in order to support tracking and reporting of important information across the facilities. The ultimate goals are to support the use of this data in informing facilities of their facility or program level trends, providing information on how your facility compares to national trends, while capturing data to answer valuable clinical and research questions at a national level.

To learn more about RHSCIR, please visit www.rickhanseninstitute.org.



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WHY IS THIS INFORMATION IMPORTANT?

The **International Standards for Neurological Classification of Spinal Cord Injury (ISNCSCI)** is an examination used to determine the motor and sensory impairment and severity of a spinal cord injury. It was originally developed by the American Spinal Injury Association (ASIA) and is now overseen by the International Standards Committee within ASIA. It allows therapists and patients to have a common language to talk about spinal cord injuries. injuriesinjuries (SCI), provides a diagnosis for the neurological component of the SCI, and allows ongoing monitoring of neurological functioning after a SCI. It is also a powerful research tool to measure the effectiveness of treatment techniques and protocols.

Benefits to Clinicians and Patients

The ISNCSCI allows therapists and patients to have a common language to talk about spinal cord injuries. It helps us to understand which motor (myotomes) and sensory (dermatomes) nerves roots are functioning normally, which are impaired or which are non-functional at the time of testing. The ISNCSCI also has some predictive value. For example, the anorectal exam can help us to understand early after injury if there has been sparing of the spinal cord which is important for predicting what functional activities the patient will be able to perform in the future. As such, it can be an important tool for patient and family education. The ISNCSCI also gives a systematic way to monitor for change in function; for example, an ascending single neurological level can be the first sign that the patient has a post-surgical complication.

Benefits to the Program

Because it is so widely used, regular and consistent ISNCSCI examinations can help to ensure proper continuity between health care professionals. Using the ISNCSCI at set time intervals, and entry of this clinical data into RHSCIR can also provide you with comparators to national data and a system of tracking to support requirements for Accreditation Canada SCI Acute and Rehabilitation Standards and Required Operating Practices. Use and tracking of this ISNCSCI data can be a powerful tool in reporting metrics to hospital administrators as it allows correlation of program expenditures (e.g. equipment, regular and overtime staffing requirements, etc.) with neurological diagnosis, as well as other demographics. The exam also informs the risk for secondary complications, such as urinary tract infections and pressure ulcers, and is predictive of length of stay.

📖 What Happens Once I Collect the Data?

- **Providing invaluable data to RHSCIR:** Once you collect the data, your hospital's RHSCIR coordinator will abstract the information from the medical record and input the data into the database with other clinical, demographic, sociodemographic, participant flow, and outcomes information. RHSCIR has developed a number of practices to ensure patient confidentiality is maintained and strict privacy policies and procedures are followed.
- **Providing a baseline for management of SCI across Canada:** The de-identified data from your hospital will be reported back to you on a biannual basis providing information on your hospital's SCI incidence, average length of stay broken down by neurological classification and other information. Details on how to access these reports are provided below.

To access your site's data reports, visit Supporting Clinical Initiatives in SCI (SCI²) resource site at <http://sci2.rickhanseninstitute.org>. Please see your local RHSCIR coordinator, or designated representative, to receive this log in information.

You can also access the SCI² site by visiting www.rickhanseninstitute.org.

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RESOURCE REQUIREMENTS

To complete collection of data as outlined in this toolkit, the following resources are required:

Time

The time to complete the exam can vary widely depending on the patient’s cognitive and physical state, your experience with the exam and other care that may be taking place at the same time. Most experienced examiners can complete this exam within 20 minutes in a patient who is alert and able to participate in the exam. However, the exam can take considerably longer in patients who are experiencing delirium, pain, fatigue or other symptoms that affect their capacity to participate. In these situations, it may be necessary to break the exam down into two or three parts to allow the patient to rest. For example, complete the motor, sensory and rectal portions of the exam on the same day but a few hours apart. If portions of the exam are completed at different times, it is important to document this in the “comments” box on the ISNCSCI form.

Equipment


- A tapered wisp of cotton (from a cotton swab or Q tip)
- A standard safety pin
- The exam form below
- Personal protective equipment as required

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FORMS

ISNCSCI Form

A version of this form you can insert into your chart is available at <http://sci2.rickhanseninstitute.org>.



INTERNATIONAL STANDARDS FOR NEUROLOGICAL CLASSIFICATION OF SPINAL CORD INJURY (ISNCSCI)



Date of Exam _____ Time of Exam _____

Examiner Name _____ Signature _____

PT Spine Surgeon Physiatrist CNS Other (specify): _____

RIGHT

MOTOR KEY MUSCLES

UER (Upper Extremity Right)

- Elbow flexors C5
- Wrist extensors C6
- Elbow extensors C7
- Finger flexors C8
- Finger abductors (little finger) T1

LER (Lower Extremity Right)

- Hip flexors L2
- Knee extensors L3
- Ankle dorsiflexors L4
- Long toe extensors L5
- Ankle plantar flexors S1

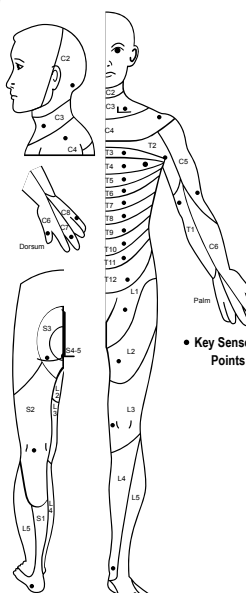
(VAC) Voluntary anal contraction (Yes/No)

RIGHT TOTALS

(MAXIMUM) (50) (56) (56)

SENSORY KEY SENSORY POINTS

Light Touch (LT) Pin Prick (PP)



• Key Sensory Points

LEFT

MOTOR KEY MUSCLES

UEL (Upper Extremity Left)

- Elbow flexors C5
- Wrist extensors C6
- Elbow extensors C7
- Finger flexors C8
- Finger abductors (little finger) T1

LEL (Lower Extremity Left)

- Hip flexors L2
- Knee extensors L3
- Ankle dorsiflexors L4
- Long toe extensors L5
- Ankle plantar flexors S1

(DAP) Deep anal pressure (Yes/No)

LEFT TOTALS

(56) (56) (50) (MAXIMUM)

MOTOR SUBSCORES

UER + UEL = **UEMS TOTAL** LER + LEL = **LEMS TOTAL**

MAX (25) (25) (50) MAX (25) (25) (50)

SENSORY SUBSCORES

LTR + LTL = **LT TOTAL** PPR + PPL = **PP TOTAL**

MAX (56) (56) (112) MAX (56) (56) (112)

BCR Status Present Absent Unknown Cauda Equina Syndrome: Yes No Unknown Need help? Automated classification available at: www.isncscialgorithm.com

NEUROLOGICAL LEVELS <small>Steps 1-5 for classification as on reverse</small>	R	L	3. NEUROLOGICAL LEVEL OF INJURY (NLI)	4. COMPLETE OR INCOMPLETE? <small>Incomplete = Any sensory or motor function in S4-S5</small>	5. ASIA IMPAIRMENT SCALE (AIS)	ZONE OF PARTIAL PRESERVATION <small>(In complete injuries only) Most caudal level with any innervation</small>	R	L
	SENSORY	MOTOR					SENSORY	MOTOR

Other Neurological Deficit
 Myelopathy
 Periph. nerve injury NO cord injury
 Periph. nerve injury with cord injury
 None
 Unknown

This form has been modified from ISNCSCI worksheet version REV 04/15 with permission from the America Spinal Injury Association. REV 04/15 RHI Version: V2015-09-26

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TIPS FOR THE EXAM

PLEASE NOTE: This document is not meant to replace current tools for the teaching of the exam (see below); rather it will focus on areas of difficulty examiners often struggle with and how to address them.

✓ Positioning

The patient must be positioned in supine. The head of bed should be flat when possible. If an alternative position is required, please make a note of the position used for the exam in the "comments" box.

⚙️ The Motor Exam*

- The examiner's hand position and the patient's body position for each myotome test is important; please refer to the INSTeP online training modules below.
- Remember that a grade of 5, or full strength, is the **full/normal strength you would expect for that patient**. This means that a grade 5 for a 20 year old female will be different than a grade 5 for a 90 year old male.
- One of the functional skills patients learn very early on is the substitution for muscles that are non-functional by those that are functional. *NOTE: It may be useful to have the ASIA ISNCSCI exam motor guide (http://www.asia-spinalinjury.org/elearning/Motor_Exam_Guide.pdf) alongside this document.*

Here are some examples of substitutions that can often "trick" testers:

- **C6 — wrist extension**
 - Patients who do not have wrist ex-tension will try to use of gravity and forearm supination.
 - **How can I prevent this?** Make sure to stabilize the wrist in neutral for grades 0, 1 and 2.
- **C7 — elbow extension**
 - Patients who do not have elbow extension will often externally rotate their shoulder and relax the arm, **OR** use a quick contraction and relaxation of biceps to mimic elbow extension by the triceps.
 - **How can I prevent this?** For grades 0, 1 and 2, make sure the



* The pictures in this section are from ASIA's INSTeP E-learning module

arm is fully internally rotated (start with the arm across the chest) and ensure that the forearm stays parallel to the ground.

➤ **C8 — 3rd distal phalanx flexion**

- Patients who do not have finger flexion will actively flex their wrist, which results in shortening of the flexor tendons of their fingers and passive finger flexion. They also sometimes use the other finger flexors (that attach closer to the palm) to mimic the motion.

- **How can I prevent this?** Ensure that the wrist, knuckle and first finger joints are all properly stabilized. The handling for this can be a bit awkward, so don't be afraid to use your forearm to stabilize their wrist, leaving your hands free for testing.

➤ **T1 — pinky finger abduction**

- Patients who do not have finger abduction will use their finger extensors to straighten and extend their finger.

- **How can I prevent this?** Palpate the “meat” or muscle belly on the side of the hand. You should feel the muscle tensing under your hand; also, watch the top surface of the hand in the grades 0, 1 and 2 position – is the finger moving up toward the ceiling, or out to the side? It should be moving out to the side.

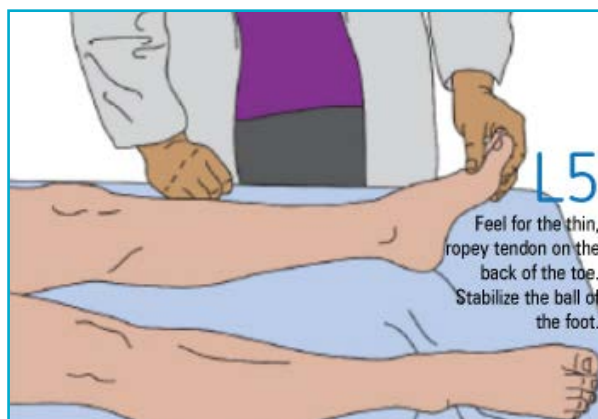
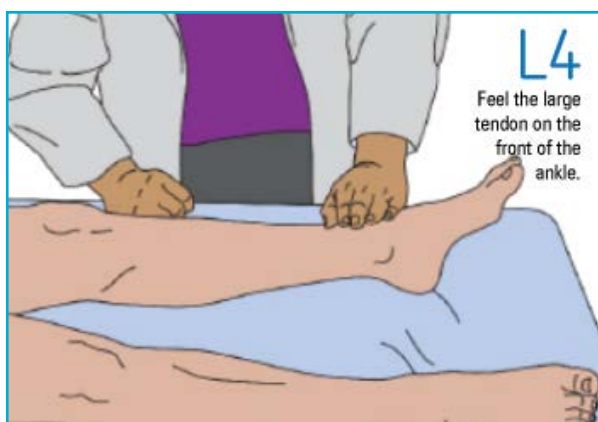
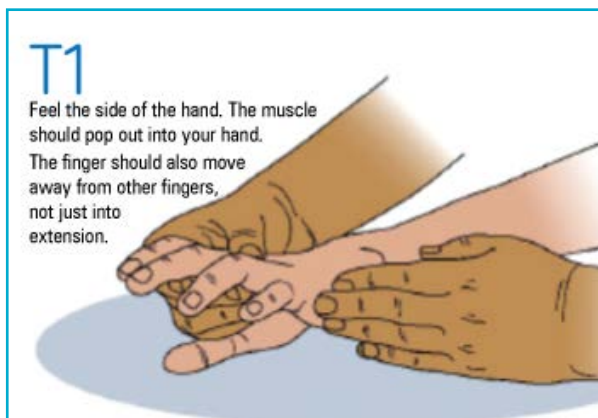
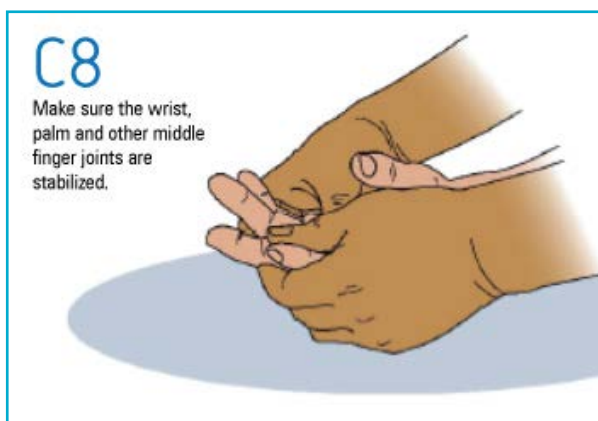
➤ **L4 — dorsiflexion**

- Patients who do not have dorsiflexion will use their toe extensors to dorsiflex their ankle, when they should be using the tibialis anterior muscle.

- **How can I prevent this?** Palpate the tibialis anterior tendon, which is at the front of the ankle. It is quite thick and should pop out against your hand. If you only notice the smaller, thinner toe tendons further down the foot popping out, the ankle may still move, but only a very small amount.

➤ **L5 — great toe extension**

- Patients who do not have great toe extension will plantarflex their foot and their toe will passively be extended because that muscle is tight (sometimes called the ‘reverse tenodesis’ phenomenon) **OR** patients will flex their great toe, and relax the muscle, which looks like active toe extension.



- **How can I prevent this?** Stabilize the ball of the foot with your fingers, while feeling the extensor tendon of the great toe with your thumb. Active toe extension will cause the tendon to pop out against your hand.

➤ S1 — plantarflexion

- In the grade 3 position, patients who do have plantar flexions may instead flex their hip away from your hands, which will lift the heel off the bed.
- **How can I prevent this?** Patients who use this strategy will pull the whole leg away – repeat the test if you feel the weight of the ball of their foot pull away from your hand. You should feel the ball of the foot push into your hand when they actively dorsiflex.



🌀 The Sensory Exam

The key sensory points to test are available at:

www.asia-spinalinjury.org/elearning/Key_Sensory_Points.pdf

To ensure accuracy, it is important to ensure that the patients eyes are closed and that the timing of verbal questions is altered (e.g. not only asking when touching so question is a verbal cue that you are touching them). Also watch that you are not touching the patient at a location other than the one you are testing. There are 2 important questions to ask when completing each of the sensory tests. The most common error with the sensory exam is not asking both important questions during each test.

For the light touch exam, the questions are:

1. Can you feel me touching you?

2. Does it feel the same as your face?

- If the patient answers "yes" to both questions, **then document that sensory point as a 2.**
- If the patient answers "yes" to question 1 but no to question 2, **then document it as a 1.**
- If the patient answers "no" to the first question, **document it as a 0.**

For the pin prick (i.e. sharp/dull discrimination) exam, the questions are:

1. Is this sharp or dull?

2. Does it feel the same as your face?

- If the patient answers question 1 correctly, and answers "yes" to question 2, **then document that sensory point as a 2.** *NOTE: if the patient answers the sharp/dull question inconsistently during pinprick testing, you should test the sensory point ten times. If the patient answers correctly 8/10 times, the ISNCSCI rules say that you should score them as having answered correctly.*
- If the patient answers question 1 correctly but answers "no" to question 2, **then document it as a 1.** *NOTE: This question is often scored incorrectly. To receive a grade of 1 or 2 for pin prick, the patient must be able to differentiate between sharp and dull.*

They receive a grade 1 if they can tell the difference between sharp and dull but it is less sharp or more sharp than their face. If they can feel the pin but cannot discriminate between sharp and dull, they receive a grade of 0.

- If they answer question 1 incorrectly, **document it as a 0.**

The Anorectal Exam

Completion of the rectal exam can cause anxiety for the patient and interact with cultural sensitivities. Given this, providing the patient with a verbal explanation of why the exam is being performed as well as an explicit description of what it entails prior to performing the exam is important in obtaining informed consent (verbal) as well as obtaining accurate assessment findings. The anorectal exam, is important for three reasons. First, it is essential to determine the ASIA Impairment Scale (AIS). Second, it is important to develop management strategies for neurogenic bowel and bladder. Finally, given that it determines whether the spinal cord injury is complete or incomplete (i.e. AIS A vs. B or C), it is the most important factor to determine a prognosis for further recovery of neurological function.

By definition, any anal sensation or voluntary contraction defines an incomplete injury. This is because this exam includes the last nerves to leave the spinal cord, so any anal sensation or voluntary contraction is evidence that some motor or sensory impulse is being conducted through the injured part of the spinal cord.

It is common to have false positive interpretations of the voluntary motor exam. This is due to the presence of anal tone (*Note: Presence of anal tone, although helpful in determining whether the patient has an upper or lower motor neuron injury, does not indicate presence of motor function and is not part of the ISNCSCI exam*) at rest and the potential for a reflex anal contraction, or contraction of other pelvic muscles such as the gluteal muscles. Conversely, false negatives can occur with well-preserved function in a patient who cannot relax.

There are two parts to the anorectal exam *NOTE: It is important to review the InStEP module on the anorectal exam to ensure not only correct technique but also a sensitive and appropriate approach to informing the patient about the exam prior to completing it.*

1. The External Exam

- S3 and S4-5 sensory testing, which has the same components as the sensory exam above – light touch sensation and pin prick discrimination.

2. The Internal Exam

- A gloved and lubricated index finger is inserted (2-3 cm for adults) through the anus into the rectum and held motionless (to avoid further stimulation of the bulbocavernosus reflex (BCR)).
- Voluntary Anal Contraction (VAC): Ask the patient to squeeze your finger like they are holding back a diarrhea bowel movement. VAC is scored as either absent or present. *NOTE: Presence of the BCR can be misinterpreted as a “voluntary” contraction. It is helpful to ask the patient to “squeeze your finger, then relax and then squeeze again” to ensure VAC is present. If you are unsure but think there might be a weak contraction, score VAC as “no” and write “may have weak anal contraction” in the “comments” box on the ISNCSCI form.*
- Deep anal pressure (DAP): Apply gentle pressure to the anorectal wall with your index finger or use your thumb to gently squeeze the anus against your index finger and ask “can you feel me touching you?” DAP is scored as either **absent** or **present** *NOTE: DAP may be the only evidence of an incomplete injury (i.e. in the absence of S3 or S4-5 sensation). Given the subjective nature of this exam and the importance of the findings; ensure that the patient can actually feel by removing your finger from the rectum (without the patient knowing) and again ask if they can feel you touching them.*

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TRAINING RESOURCES

A digital version of the most up-to-date ISNCSCI form is available here:
www.asia-spinalinjury.org/elearning/ASIA_ISCOS_high.pdf.

The ASIA learning centre has an online training program, InSTeP: International Standards e-Training program available at: <http://asialearningcenter.com>. All Rick Hansen Institute network facility employees and trainees have free access to the certificate program.
Please contact your Rick Hansen Spinal Cord Injury Registry Local Site Coordinator, or email clinical@rickhanseninstitute.org.

The ISNCSCI algorithm is an online, validated tool for performing the classification of ISNCSCI exams: www.isncscialgorithm.com/.

Questions or comments regarding this guideline?
Email clinical@rickhanseninstitute.org.



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