

RICK HANSEN SPINAL CORD INJURY REGISTRY

A look at Spinal Cord Injury in Canada in 2023



PRAXIS

Spinal Cord Institute
Institut de la moelle épinière



ABOUT THIS REPORT

The Rick Hansen Spinal Cord Injury Registry (RHSCIR): A look at SCI in Canada in 2023 provides a snapshot of information on people who sustained a *traumatic spinal cord injury (tSCI)* or *non-traumatic spinal cord injury (ntSCI)* in Canada. In this report, you will find information about the type of injury, patient demographics, care pathway, length of hospital stay, secondary complications and social impacts after spinal cord injury (SCI). This is a small subset of the data that RHSCIR collects; other information includes details about surgery and other interventions, detailed diagnosis information, functional outcomes such as walking proficiency and independence, and services provided to participants. The purpose of this report is to serve as a descriptive account with no endorsement of, or recommendations about, policies or programs.

RHSCIR is a *prospective observational study* that collects demographic and clinical data from Canadian acute and rehabilitation (rehab) hospitals specializing in SCI care and treatment. Information from individuals with SCI is collected during their hospital stay and throughout their lifetime after integrating back into the community. With 30 participating facilities from across Canada, RHSCIR includes over 14,000 participants, making it the largest registry that tracks the experiences of individuals living with SCI in Canada.

QUICK REFERENCE

SCI	spinal cord injury
tSCI	traumatic spinal cord injury
ntSCI	non-traumatic spinal cord injury

For previous reports and more details, visit <https://praxisinstitute.org/research-care/key-initiatives/national-sci-registry/>

A NOTE OF THANKS

Thank you to the 14,326 individuals with SCI who have generously contributed their time and experiences to RHSCIR. We also wish to thank the dedicated clinicians, researchers and coordinators who collect, analyze and input data into RHSCIR. The contributions of everyone involved are vital to improving the care for those with spinal cord injuries and maximizing the potential for these individuals and others to reach the fullest recovery possible.

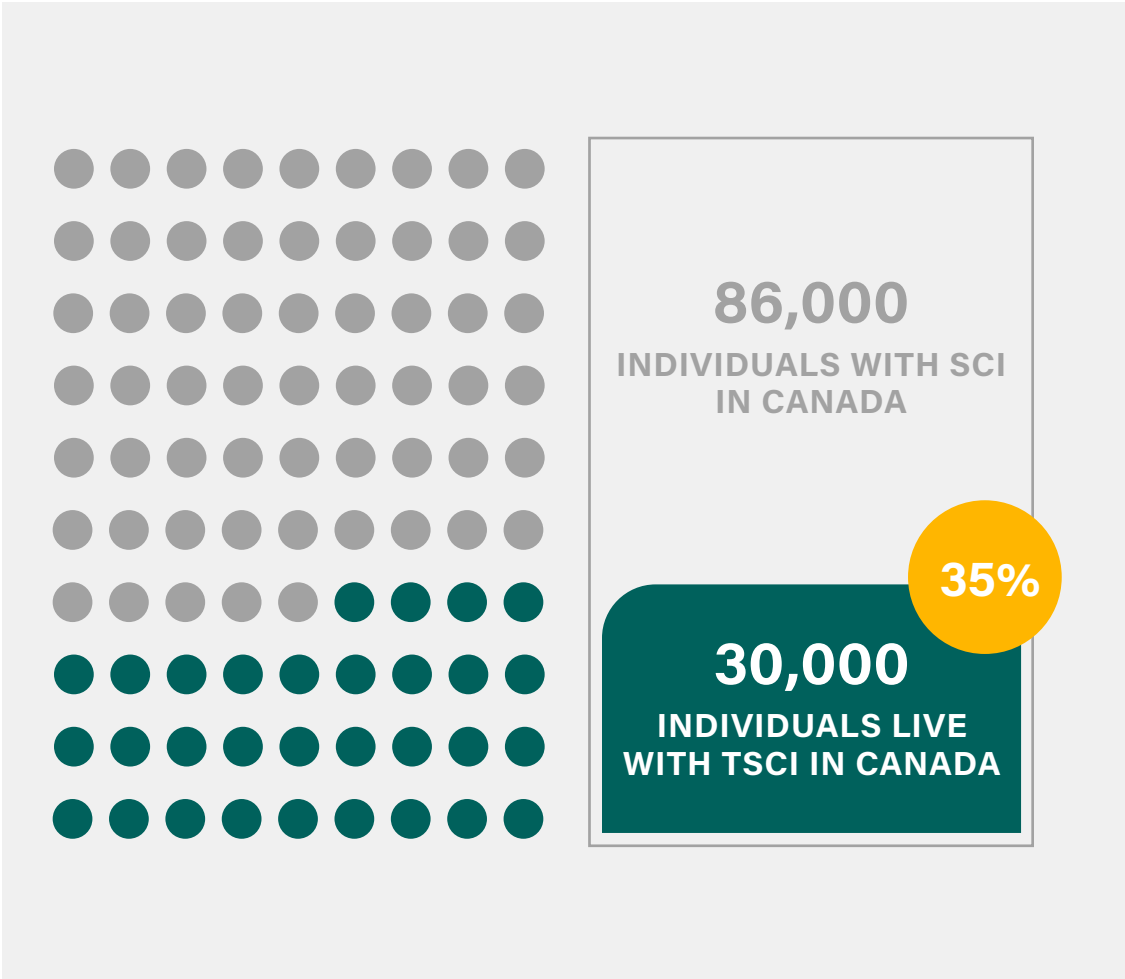


SPINAL CORD INJURY AND THE REGISTRY

Spinal cord injury is a complex, debilitating and costly condition. No two injuries are the same and it can happen to anyone, at any time. tSCI refers to injuries to the spinal cord or cauda equina that are sustained as a result of trauma such as serious vehicle crashes or falls. ntSCI refers to any impairment of the spinal cord or cauda equina function that is not the direct result of an external force or trauma, but is instead the result of illness, degenerative changes, or congenital deformities. Degenerative disorders and spinal tumours constitute the most common causes of ntSCI, whereas less common causes include vascular injury, infection, congenital deformities, and inflammatory conditions. Amyotrophic Lateral Sclerosis (ALS) and Multiple Sclerosis (MS) are not included in the RHSCIR non-traumatic data set.

In 2023, there were 787 tSCI and 571 ntSCI new RHSCIR participants. RHSCIR captures 60-70% of all acute tSCI in Canada when compared to other national data sources (Canadian Institute for Health Information).¹

In Canada, of the 86,000 individuals living with SCI, it was estimated that approximately 30,000 people live with tSCI.^{2,3} Although SCI affects fewer individuals when compared to other chronic conditions, the economic burden is substantial. For people with tSCI, it was estimated that approximately 1,100 people were discharged from hospital with a tSCI each year and the estimated average lifetime cost is \$2 million per individual.^{3,4} This includes direct costs like hospital stay and indirect costs such as lost productivity due to premature mortality.



¹ Noonan VK, Chan E, Santos A, Soril L, Lewis R, Singh A, Cheng CL, O'Connell C, Truchon C, Paquet J, Christie S, Ethans K, Tsai E, Ford MH, Drew B, Linassi AG, Bailey CS, Fehlings MG; RHSCIR Network. Traumatic Spinal Cord Injury Care in Canada: A Survey of Canadian Centers. *J Neurotrauma*. 2017;34(20):2848-2855.

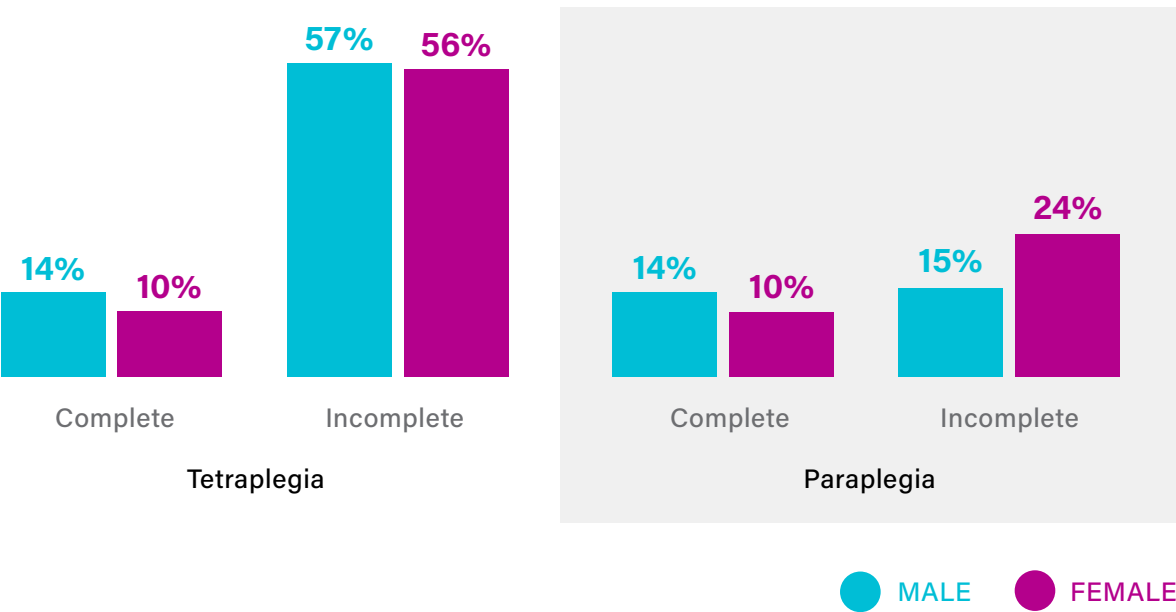
² Noonan VK, Fingas M, Farry A, Baxter D, Singh A, Fehlings MG, Dvorak MF. Incidence and Prevalence of Spinal Cord Injury in Canada: A National Perspective. *Neuroepidemiology*. 2012;38:219-226

³ Thorogood NP, Noonan VK, Chen X, Fallah N, Humphreys S, Dea N, Kwon BK, Dvorak MF. Incidence and prevalence of traumatic spinal cord injury in Canada using health administrative data. *Frontiers in Neurology*. 2023;14:1201025.

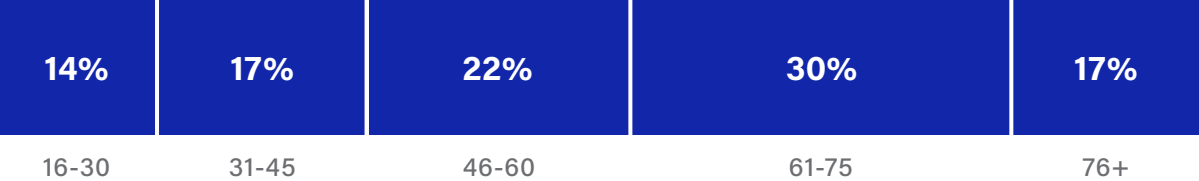
⁴ Krueger H, Noonan VK, Trenaman LM, Joshi P, Rivers CS. The economic burden of traumatic spinal cord injury in Canada. *Chronic Diseases and Injuries Canada*. 2013;33(3):113-112.

WHAT DOES THE tSCI RHSCIR POPULATION LOOK LIKE?

Injury Severity by Sex: tSCI



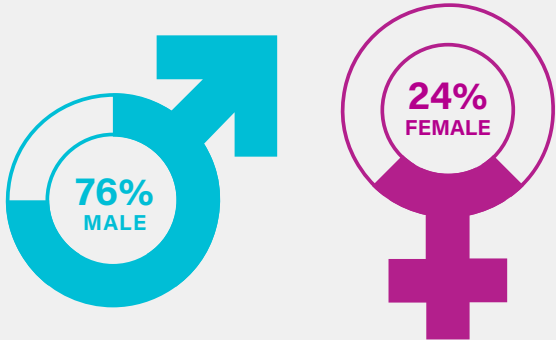
RHSCIR Population by Age Group: tSCI



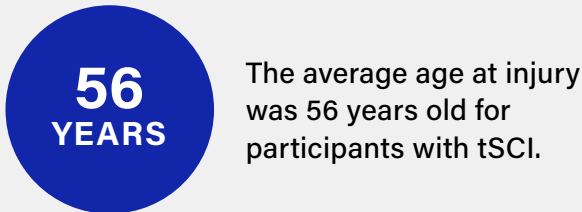
tSCI
traumatic spinal
cord injury

RHSCIR Population by Sex

76% of participants with tSCI were male.



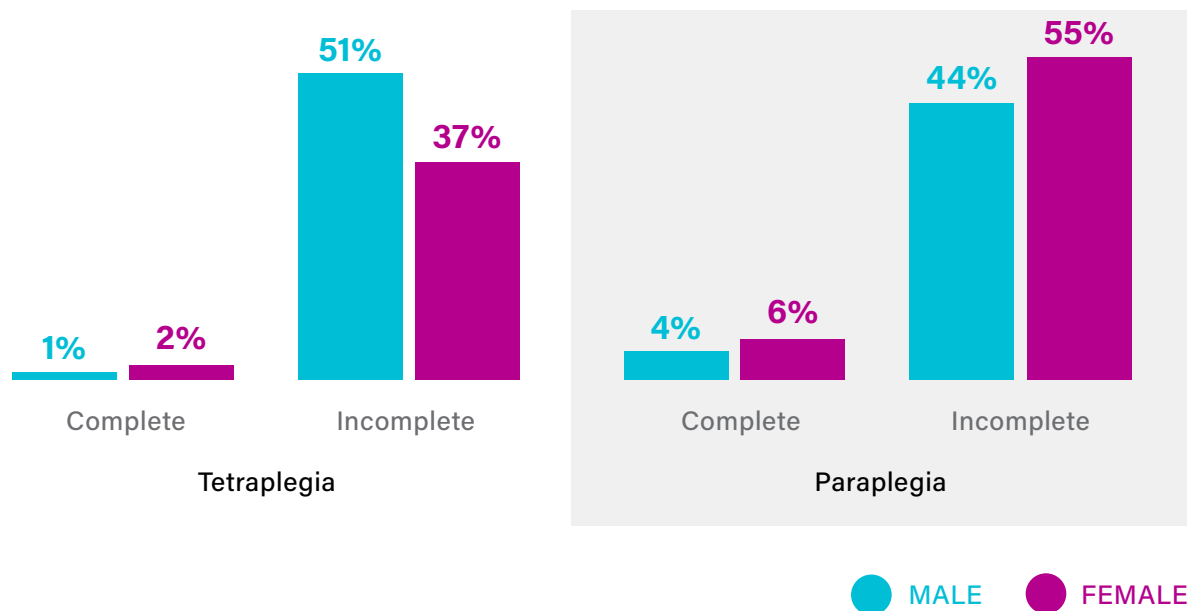
Average Age at Injury



WHAT DOES THE ntSCI RHSCIR POPULATION LOOK LIKE?

ntSCI
non-traumatic
spinal cord injury

Injury Severity by Sex: ntSCI

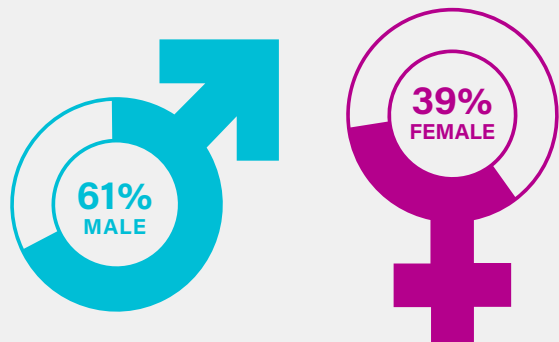


RHSCIR Population by Age Group: ntSCI

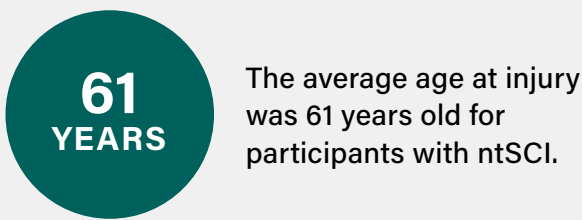


RHSCIR Population by Sex

61% of participants with ntSCI were male.



Average Age at Injury



WHAT IS THE SEVERITY AND LEVEL OF INJURY?

Tetraplegia or quadriplegia is complete or partial loss of sensation and/or movement in the arms, and typically in the torso and legs.

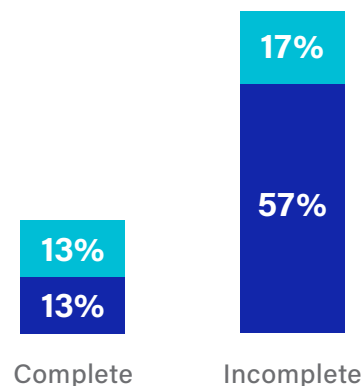
Paraplegia, on the other hand, is complete or partial loss of sensation and/or movement in the legs and often in part of, or the entire torso.

Tetraplegia was more common than paraplegia among participants with tSCI.

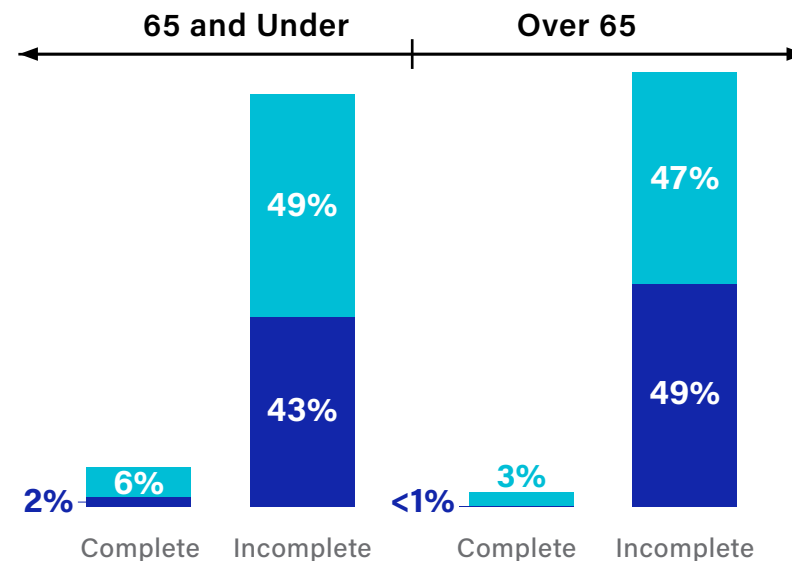
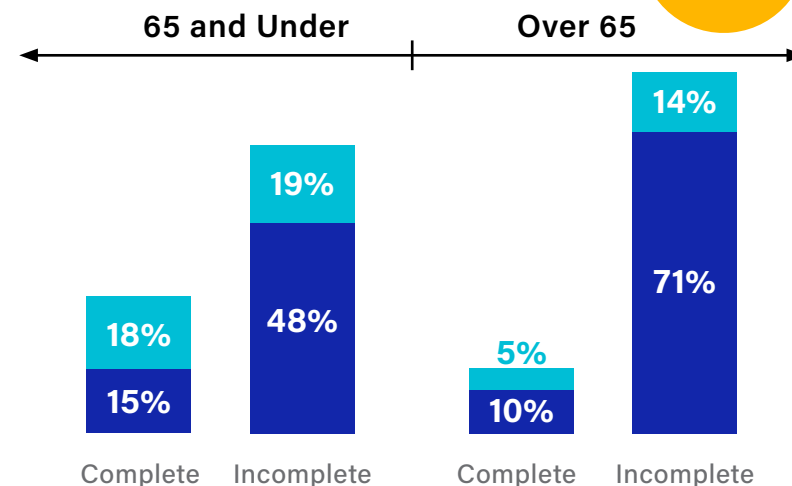
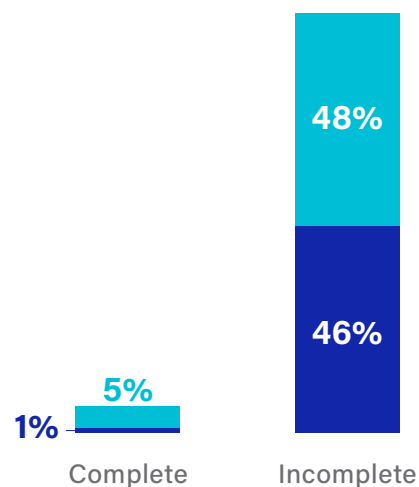
Paraplegia was slightly more common among participants with ntSCI.

Incomplete injuries were more common than **complete injuries** in both participants with tSCI and ntSCI across all age groups.

Severity and Level of Injury: tSCI



Severity and Level of Injury: ntSCI



● TETRAPLEGIA ● PARAPLEGIA

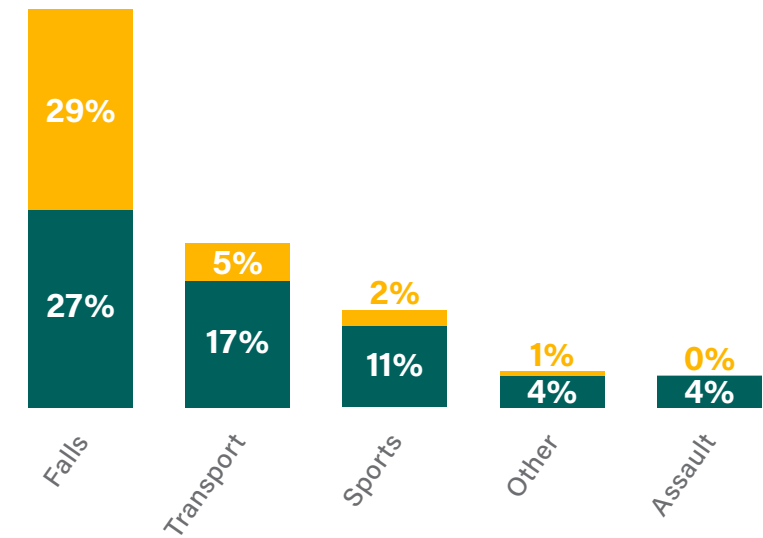
HOW DOES THE INJURY OCCUR?

The mechanism of injury provides a snapshot of how participants were injured.

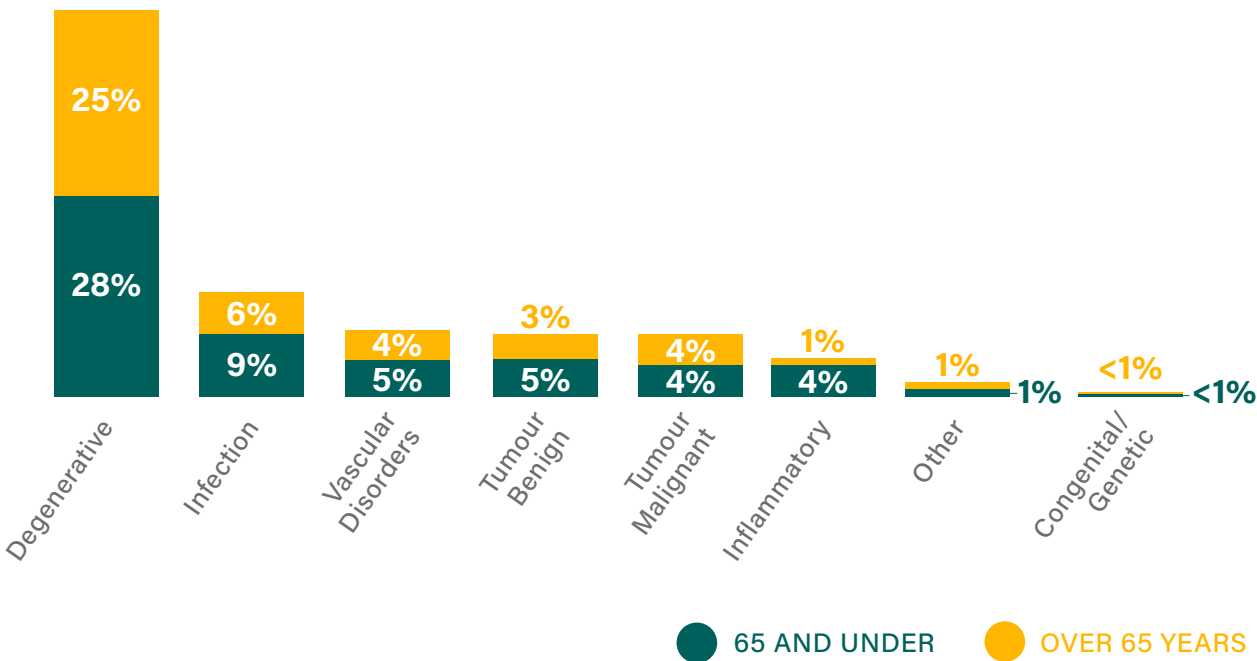
The most common type of traumatic injury was falls, followed by transportation, sports, other causes of injury (e.g. work-related injuries), and assault. The average age for people who experienced a fall was 63 years old and for those who experienced a transportation injury it was 49 years old.

The most common non-traumatic cause was *degenerative disease*, followed by *infection*, *vascular disorders*, *benign tumour*, *malignant tumour*, *inflammation*, other non-traumatic causes (e.g. *spinal hematomas*), and *congenital/genetic disorders*. The average age for people who experienced a degenerative disease was 63 years old and for those who experienced a vascular disorder it was also 63 years old.

Mechanism of Injury by Age Group: tSCI



Etiology of Injury by Age Group: ntSCI



WHERE DO PEOPLE GO AFTER INJURY TO RECEIVE TREATMENT?

75% of participants with tSCI were admitted to a SCI-specialized acute hospital within 24 hours from injury regardless of whether they first went to a non-specialized hospital.

Percentage of Individuals Admitted to a RHSCIR Acute Hospital Within 24 Hours: tSCI



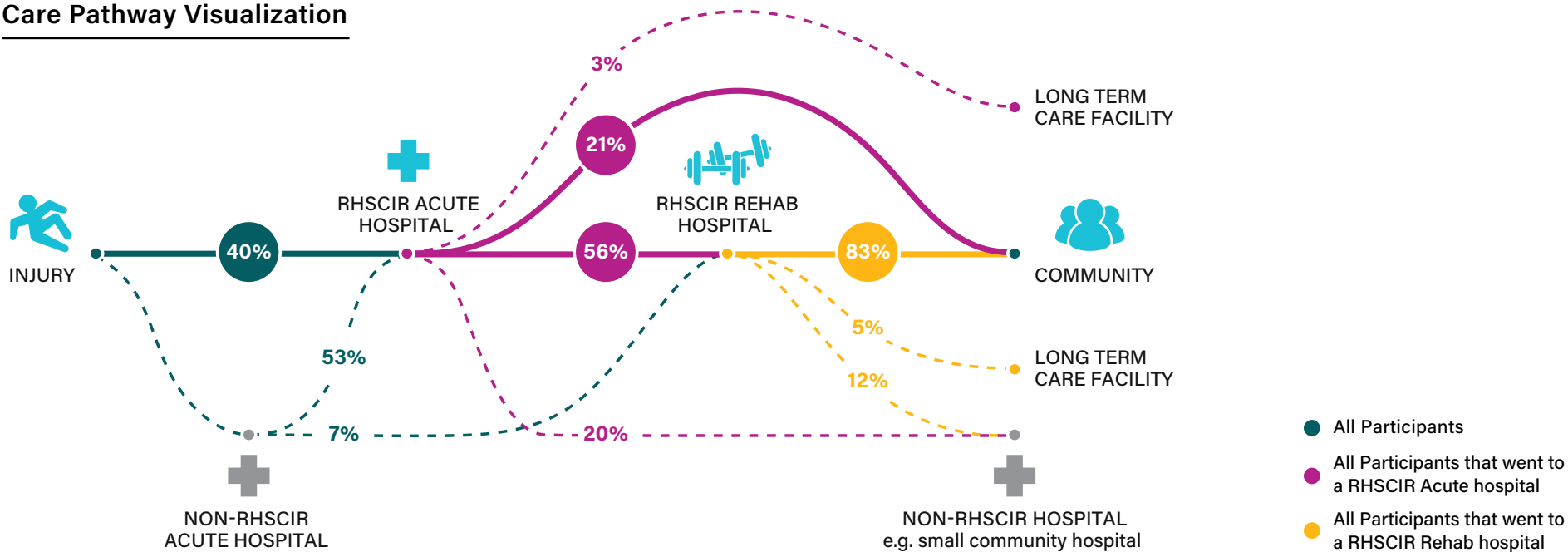
WHAT IS A PERSON’S CARE PATHWAY FOLLOWING A SPINAL CORD INJURY?

The care pathway is the journey an individual takes from the moment the injury is sustained until they return to the community or to a hospital closer to home. The ideal care pathway for a person who sustains a tSCI is to be admitted as soon as possible to a *RHSCIR Acute Hospital* and then, if necessary, admitted to a *RHSCIR Rehab Hospital* to receive specialized rehab care.

Most individuals with tSCI were admitted to a RHSCIR Acute Hospital either directly (40%), or indirectly (53%) via a non-RHSCIR Acute hospital. The remaining 7% of participants were admitted to a non-RHSCIR Acute hospital prior to being admitted to a RHSCIR Rehab Hospital. Regardless of their care pathway, 91% of individuals received surgery. For individuals with tSCI admitted to a RHSCIR Acute Hospital, 56% went on to a RHSCIR Rehab Hospital before returning to the community. 8% of participants admitted to a RHSCIR Acute or Rehab Hospital were discharged to a long-term care facility.

Mortality during the initial SCI-specialized acute hospital stay was 9% for tSCI participants.

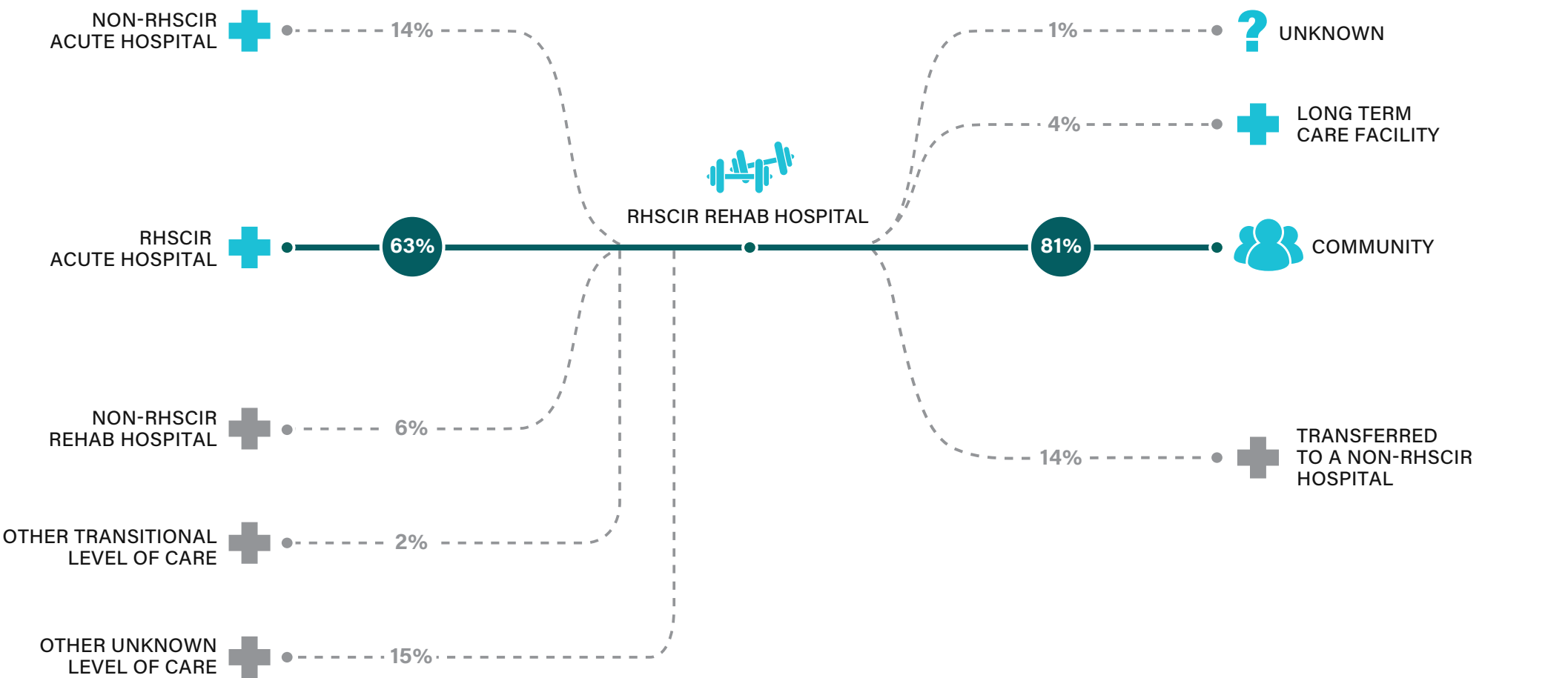
Care Pathway Visualization



Note: Only individuals who survived their injury and acute hospital stay are included in the care pathways.

For individuals with ntSCI who arrived at a RHSCIR Rehab Hospital, 63% arrived from a RHSCIR Acute Hospital and 14% arrived from a non-RHSCIR Acute hospital. The remainder arrived from a non-RHSCIR Rehab hospital (6%) or from other locations (17%) such as the community.

81% of individuals with ntSCI were discharged to the community (e.g. home, assisted living) after their inpatient stay at a RHSCIR Rehab Hospital and 4% were discharged to long term care.

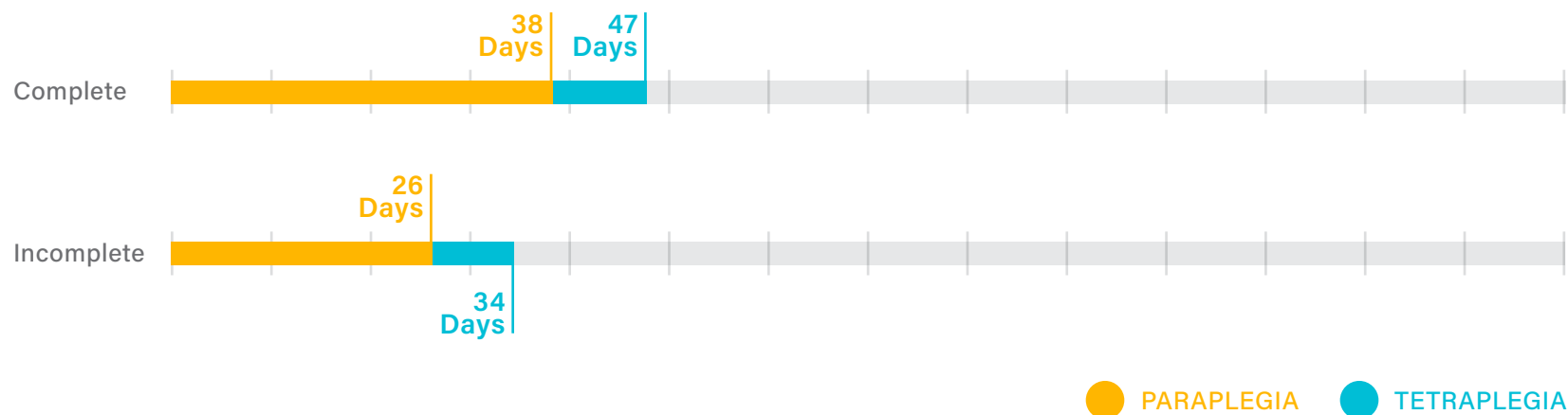


WHAT IS THE DURATION OF THE HOSPITAL STAY?

RHSCIR captures length of stay during acute and rehab admissions for those with tSCI, and length of stay during rehab admissions for those with ntSCI.

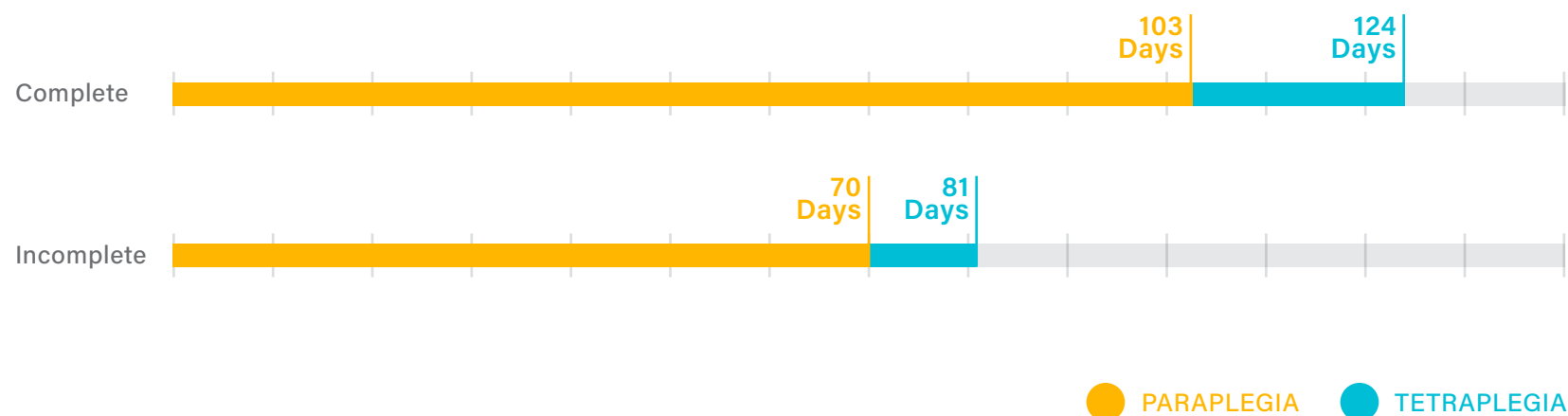
The average acute length of stay was 47 days for individuals with tSCI with complete tetraplegia, 34 days for those with incomplete tetraplegia, 38 days for those with complete paraplegia and 26 days for those with incomplete paraplegia.

Average (mean) Length of Stay During Acute Care in Days: tSCI



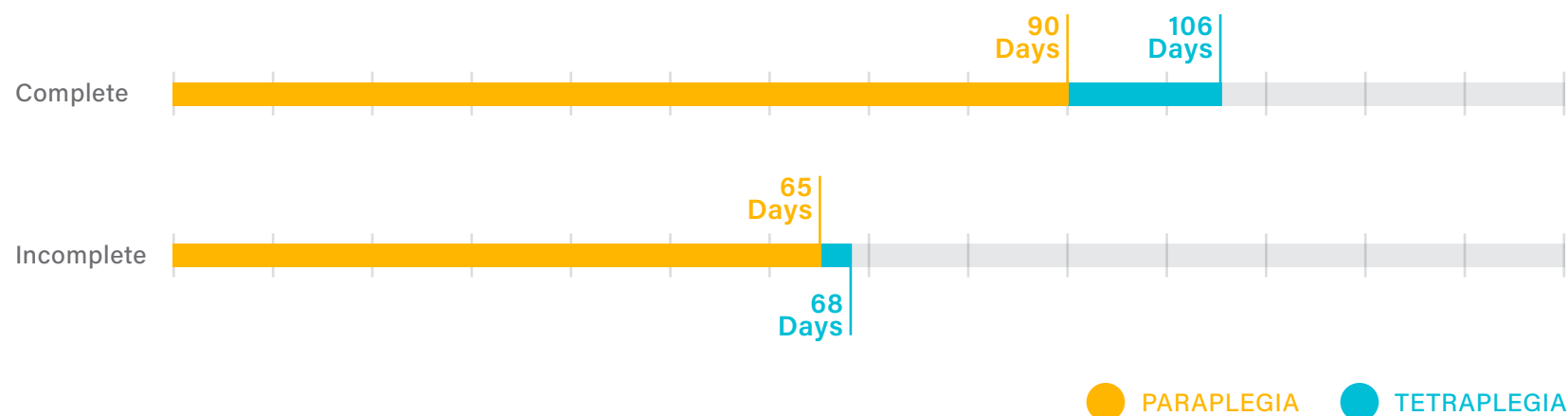
For individuals with tSCI who were admitted to a RHSCIR Rehab Hospital, the average length of stay was 124 days for those with complete tetraplegia, 81 days for those with incomplete tetraplegia, 103 days for those with complete paraplegia and 70 days for those with incomplete paraplegia.

Average (mean) Length of Stay During Rehab Care in Days: tSCI



For individuals with ntSCI who were admitted to a RHSCIR Rehab Hospital, the average length of stay was 106 days for those with complete tetraplegia, 68 days for those with incomplete tetraplegia, 90 days for those with complete paraplegia and 65 days for those with incomplete paraplegia.

Average (mean) Length of Stay During Rehab Care in Days: ntSCI



HOW OFTEN DO SECONDARY COMPLICATIONS OCCUR IN ACUTE AND/OR REHAB CARE?

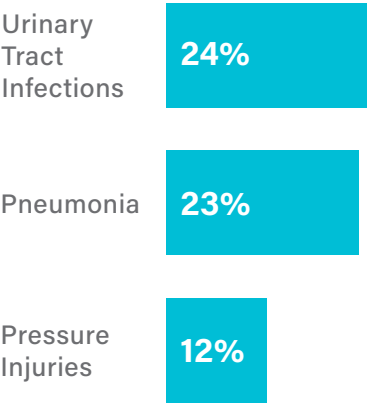
Secondary complications refer to the range of conditions that can occur after sustaining the initial SCI.

Urinary tract infections (UTIs) were the most common secondary complication in individuals with tSCI during their acute and/or rehab stays. For individuals with tSCI in acute care, *pneumonia* was the next common, followed by *pressure injuries*.

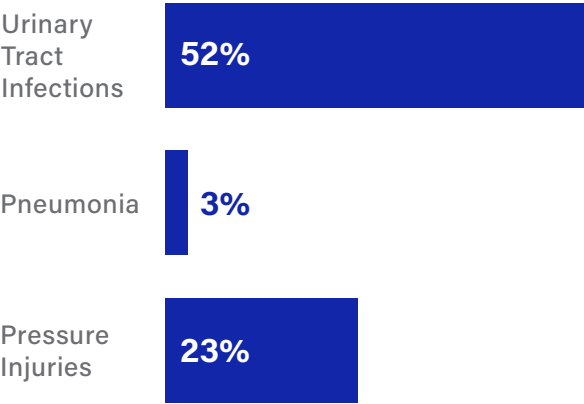
For individuals with tSCI in rehab, pressure injuries were the second most common, followed by pneumonia. 55% of individuals with tSCI reported the occurrence of at least one of the secondary complications during acute and/or rehab stays and 23% reported multiple secondary complications.

UTIs were the most common secondary complication in ntSCI individuals during rehab stays, pressure injuries were the second most common, followed by pneumonia. 46% of ntSCI individuals reported having at least one of the secondary complications and 11% had multiple secondary complications during their stay in rehab.

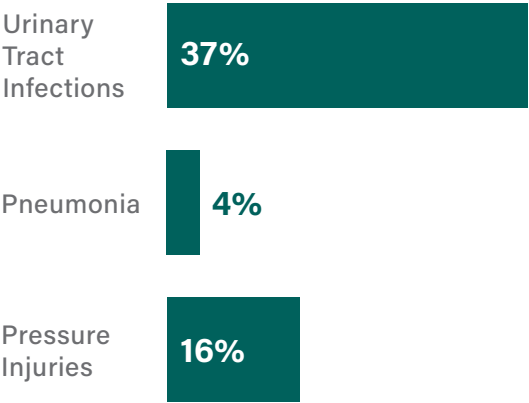
Secondary Complications During Acute Care: tSCI



Secondary Complications During Rehab Care: tSCI



Secondary Complications During Rehab Care: ntSCI



WHAT ARE THE SOCIAL IMPACTS POST-INJURY?

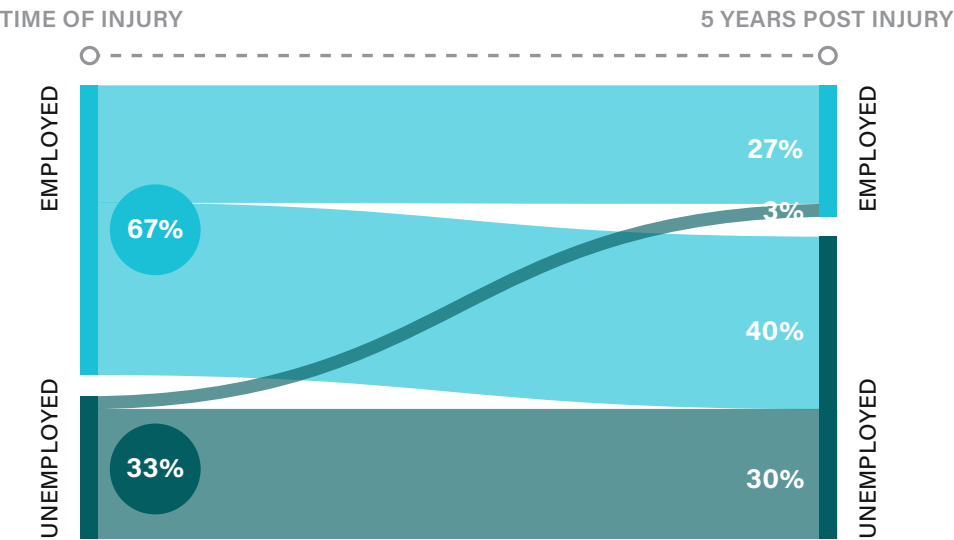
An individual sustaining a tSCI may experience a number of significant life changes, most notably in employment status, household income, and relationships. The following information comprises participant responses recorded at five years post-injury via follow-up interviews completed with individuals with tSCI between 2020 and 2022. Currently this information is not collected in the registry for those with ntSCI.

At five years post-injury, 40% of individuals who were employed at the time of their injury became unemployed. Of those who were unemployed at the time of their injury, only 3% had become employed at five years post-injury.

Of the participants who earned less than CAD \$60,000 per year, 33% saw a decrease in income at five years post-injury. Of the participants who earned more than CAD \$60,000 per year, 61% saw a decrease in income at five years post-injury.

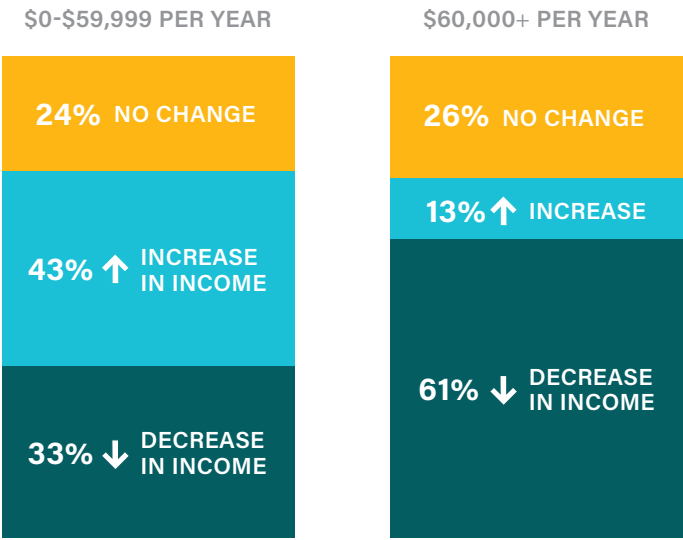
Change in Employment Status Five Years Post-Injury

234 people answered this question



Change in Household Income Five Years Post-Injury

164 people answered this question

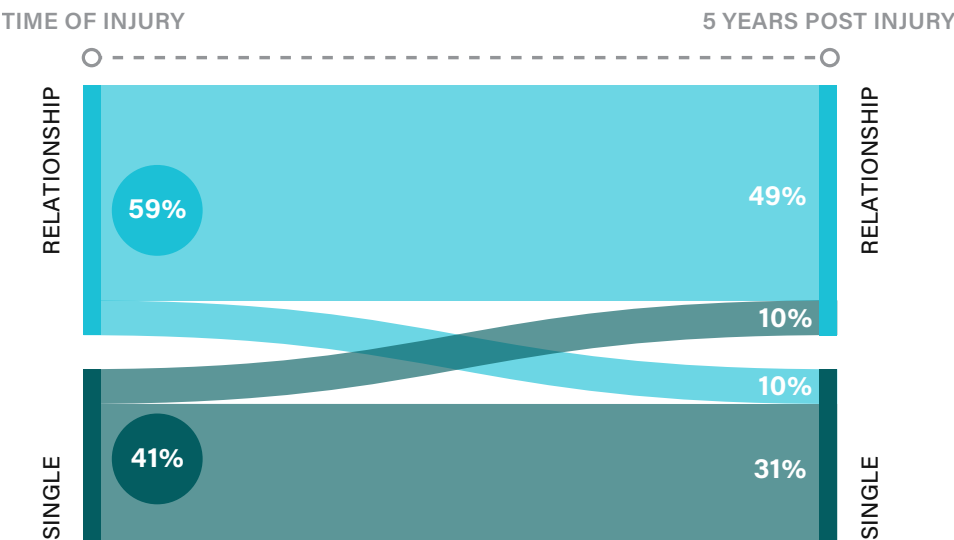


WHAT ARE THE SOCIAL IMPACTS POST-INJURY?

Relationship status did not appear to be significantly impacted five years after the injury. Among the 232 people with complete data, 49% were in a relationship both pre-injury and five years post-injury, 10% were in a relationship pre-injury but not five years post-injury, 10% were single pre-injury and were in a relationship five years post-injury, and 31% were single both pre-injury and five years post-injury.

Change in Relationship Status Five Years Post-Injury

232 people answered this question



For more information on interpreting a Sankey Diagram visit <https://www.data-to-viz.com/graph/sankey.html>⁵



⁵ Holtz Y, Healy C. Sankey diagram [Internet]. from Data to Viz; [cited 2023 May 29]. Available from: <https://www.data-to-viz.com/graph/sankey.html>

RHSCIR DATA PROVIDES INSIGHTS TO IMPROVE CARE

RHSCIR will continue to connect clinicians, researchers, health care administrators and people living with SCI in order to facilitate the translation of research into clinical practice, and promote evidence-based practices to improve outcomes for those living with SCI. As we move forward, RHSCIR will keep evolving to ensure it facilitates world class research, promotes excellence in care and meets the needs of people living with SCI.

DENOMINATORS FOR REPORT SUMMARIES

Note: RHSCIR collects both a core data set (minimal data set for both consented and non-consented participants) and an expanded data set for consented participants only.

Data for those with tSCI is collected during acute and rehab care and at community follow-up. Data for those with ntSCI is collected during rehab care only.

The RHSCIR data used for this report was extracted on January 16th 2025.

Percentages shown in each of the summaries have been calculated using the denominators above, individuals with missing data have not been included. This may skew the results if the pattern of missing data is not random and summaries should be interpreted accordingly.

Data Collected	tSCI	ntSCI
Number of new injuries in 2023	787	571
Number of consented participants (expanded data set)	282 (36%)	N/A
Age	780	571
Sex	780	571
Severity of Injury by Sex	466	454
Severity and Level of Injury	466	454
Severity and Level of Injury by Age	466	454
Mechanism of Injury	671	519
Mechanism of Injury by Age	671	519
Time to RHSCIR Admission within 24 Hours	628	N/A
Where do people go after injury	628	516
Care Pathway	618	516
Length of Stay in Acute	398	N/A
Length of Stay in Rehab	276	445
Secondary Complications - Pneumonia, UTI, Pressure Injuries (Acute or Rehab)	721	N/A
Secondary Complications - Pneumonia, UTI, Pressure Injuries (Acute)	643	N/A
Secondary Complications - Pneumonia, UTI, Pressure Injuries (Rehab)	389	527
Surgery	678	N/A
Employment	234	N/A
Income	164	N/A
Relationship Status	232	N/A

GLOSSARY

Complete injury

An injury where there is no sensory and motor function (ability to feel, touch or move) preserved in the last nerves leaving the spinal cord (sacral 4th and 5th nerves). This usually results in a total lack of sensory and motor function below the level of the injury.

Congenital/genetic disorder

A disease or physical abnormality present from birth that causes damage to the spinal cord (e.g. skeletal malformations or tethered cord syndrome).

Incomplete injury

An injury where there is some sensory or motor function (ability to feel, touch or move) below the level of the injury. This must include the last nerves leaving the spinal cord (sacral 4th and 5th nerves).

Inflammation

Inflammation of the spinal cord from non-infectious causes (e.g. autoimmune conditions such as transverse myelitis).

Non-traumatic spinal cord injury (ntSCI)

A spinal cord injury that is not the direct result of an external force, but is instead a result of illness (e.g. cancer or infection), degenerative changes, or birth defect.

Paraplegia

Complete or partial loss of sensation and/or movement in the legs and often in part of, or the entire torso. It is caused by an injury to the spinal cord in the thoracic region (torso) or below.

Pneumonia

An infection in the lungs.

Pressure ulcer/injury

Damage to skin and underlying tissue caused by pressure and/or shear.

Prospective observational study

A prospective study is designed to collect data on a going forward basis; in this instance, RHSCIR coordinators collect information from the time of injury through discharge from RHSCIR facilities

and conduct follow-up interviews at 18 months, five- and ten-year intervals to collect demographic and clinical data from participants. “Observational” indicates that there is no action or treatment included in the study but rather, an observation of the existing conditions reported by the participant and collected from medical records by the RHSCIR coordinator. This information can be used to inform future decisions through research and clinical care.

RHSCIR Acute Hospital

A trauma hospital that delivers specialized SCI care and participates in RHSCIR.

RHSCIR Rehabilitation Hospital

A rehabilitation hospital that delivers specialized SCI care and participates in RHSCIR.

Spinal cord injury (SCI)

The impairment of sensory and/or muscle function due to damage of the nerves in the spinal cord.

Spinal hematoma

Accumulation of blood which mechanically compresses the spinal cord.

Tetraplegia

Complete or partial loss of sensation and/or movement in the arms, and typically in the torso and legs. It is caused by an injury to the spinal cord in the neck.

Traumatic spinal cord injury (tSCI)

A spinal cord injury that occurs as a result of trauma such as a vehicle crash or fall.

Urinary tract infection (UTI)

A bacterial infection of the urinary tract.

Vascular disorder

Any condition which disrupts the usual blood supply to the spinal cord. This can include hemorrhage, clot/infarcts and vascular malformations.

HOW TO CITE THIS DOCUMENT?

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Praxis Spinal Cord Institute through
the Government of Canada and the
Government of British Columbia.

The Praxis Spinal Cord Institute
is a Canadian-based not-for-profit
organization with the goal of creating
a world without paralysis after *spinal
cord injury*. It works towards this goal
by accelerating research and translating
clinical findings into practical solutions
to develop new treatments, improve
health care outcomes, reduce long-term
costs and improve the quality of life
for those living with spinal cord injury,
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Praxis Spinal Cord Institute is located on the
unceded traditional territory of the Coast Salish
Peoples, specifically the shared traditional territories
of the Skwxwú7mesh (Squamish), xʷməθkʷəy̓əm
(Musqueam) and səliilwətaʔl (Tsleil-Waututh)
First Nations.

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