

Author Year Country Research Design PEDro Score Total Sample Size	Methods	Outcome
<p>Furlan & Fehlings, (2009) Canada Observational N_{Initial}=499, N_{Final}=396</p>	<p>Population: <i>Younger Individuals (<65yr; n=455)</i>: Mean age=31.9yr; Gender: males=82.9%, females=17.1%; Level of injury: cervical=65.6%, thoracolumbar=24.4%; Severity of injury: complete=51.9%, incomplete=48.1%; Time since injury=not reported. <i>Older Individuals (>65yr; n=44)</i>: Mean age=75yr; Gender: male=92.7%, female=7.3%; Level of injury: cervical=89.5%, thoracolumbar=10.5%; Severity of Injury: complete=29.5%, incomplete=70.5%; Time since injury=not reported. Intervention: No intervention. Prospective observational analysis of the impact of age on mortality, impairment and disability among adults with acute traumatic SCI. Outcome measures were assessed at 6wk, 6mo and 12mo. Outcome Measures: Mortality, FIM.</p>	<ol style="list-style-type: none"> 1. Mortality rates among older individuals were significantly greater than younger individuals (38.6% versus 3.1%; p<0.0001). 2. Among survivors, age was not significantly correlated with motor recovery or change in pain scores in the acute and chronic stages of SCI (p>0.05). 3. Older individuals experienced greater functional deficit (as measured by FIM) than younger individuals (p<0.05) despite experiencing similar rates of sensorimotor recovery.
<p>Osterthun et al. (2009) Netherlands Case control N_{Initial}=919, N_{Final}=919</p>	<p>Population: <i>Traumatic SCI</i>: Mean age=43.4yr; Gender: male:female=2.8:1; Level of injury: tetraplegia=49.6%; Severity of injury: complete=52.3%; <i>Non-traumatic SCI</i>: Mean age=57.2yr; Gender: male:female=1.2:1; Level of injury: tetraplegia=24.2%; Severity of injury: complete=25.9% Intervention: No intervention. Those with traumatic SCI were compared to those with non-traumatic SCI. Outcome Measures: Functional status, LOS.</p>	<ol style="list-style-type: none"> 1. Age and better functional status on admission was associated with shorter length of stay (p=0.001). 2. Functional outcome was not correlated with age; however it was significantly correlated with functional status at admission and LOS.
<p>Gupta et al. (2008) India Case Control N_{Initial}=76, N_{Final}=76</p>	<p>Population: <i>Traumatic (n=38)</i>: Mean age=32.86yr; Gender: males=34, females=4. <i>Non-traumatic (n=38)</i>: Mean age=31.10; Gender: males=16, females=22 Intervention: Admission/discharge data from all surviving non-traumatic and traumatic spinal cord lesion (SCL) patients in a neurological rehabilitation facility was assessed over a 2yr period. Outcome Measures: Length of stay; AIS collected at admission and discharge.</p>	<ol style="list-style-type: none"> 1. The traumatic SCL group was not significantly different in age, marriage, education or socioeconomic factors (p>0.05).
<p>McKinley et al. (2008) USA Case control N_{Initial}=594, N_{Final}=594</p>	<p>Population: Infection related spinal cord disease (<i>IR-SCD</i>): Mean age=53.3yr; Gender: males=64.7%; Level of injury: paraplegia=74%. Traumatic SCI: Mean age=40.4yr; Gender: males=83.8%; Level of injury: paraplegia=49%</p>	<ol style="list-style-type: none"> 1. When compared with traumatic SCI (n=560), patients with IR-SCD comprised significantly less of the SCI/D rehabilitation admissions (3% versus 61%), were older (53 versus 40yr), and more often female (35% versus 16%). Injuries

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	<p>Intervention: No intervention. Data was reviewed of individuals diagnosed with infection related SCD against those with traumatic SCI.</p> <p>Outcome Measures: Acute and rehabilitation hospital LOS, FIM motor scores, FIM motor change, FIM motor efficiency, AIS change.</p>	<p>were more commonly located in the thoracic region (48% versus 38%).</p>
<p>Tchvaloon et al. (2008) Israel Case series N_{Initial}=143, N_{Final}=143</p>	<p>Population: Mean age=37.8yr; Gender: M:F=4.95:1; Level of injury: C=43%, T=49.3%, L=7.7%; Severity of injury: complete=41%, incomplete=59%.</p> <p>Intervention: No intervention. Data from patients with a SCI due to a road accident was analyzed.</p> <p>Outcome Measures: Neurological recovery, Functional recovery, complications.</p>	<ol style="list-style-type: none"> 1. Negative association was seen between survival and age at injury ($p<0.001$) and pressure sores ($p=0.006$). 2. No significant effect on recovery was seen due to age at injury, gender, presence of pressure sores and complications.
<p>Anzai et al. (2006) Canada Case series N_{Initial}=52, N_{Final}=52</p>	<p>Population: Mean age=45.3yr; Gender: males=77%, females=23%; Level of injury: C4=63%; Severity of Injury: AIS A=60%</p> <p>Intervention: No intervention. Retrospective chart review was conducted on patients admitted to GF Strong Spinal Cord Program between 1994 and 2003.</p> <p>Outcome Measures: Discharge destination, factors associated with discharge to ECU.</p>	<ol style="list-style-type: none"> 1. Older individuals had a 4% increased risk of being discharged to an extended care unit. 2. Good levels of social support were found to be protective factors 3. Pre-existing medical conditions were associated with 10 times greater risk 4. Unemployment and not having funding from insurance were associated with 5 times greater risk.
<p>New et al. (2005) Australia Case Series N_{Initial}=70, N_{Final}=62</p>	<p>Population: <i>Non-traumatic SCI:</i> Mean age=69yr; Level and severity of injury: AIS B-D, tetraplegia=32.9%, AIS A, paraplegia=8.6%, AIS B-D=58.6%; Time since injury: <7 days=78.6%; Time to rehabilitation=30.9 days.</p> <p>Intervention: No intervention. Outcomes associated with non-traumatic SCI rehabilitation were assessed.</p> <p>Outcome Measures: Demographics, clinical characteristics, LOS, Discharge setting, level of lesion and AIS, FIM, mobility, bowel and bladder function. Collected at admission to and discharge from rehabilitation.</p>	<ol style="list-style-type: none"> 1. Those subjects' male, younger, more mobile, more independent bowel and bladder function and less severe AIS grades were more likely to be discharged home.
<p>Ronen et al. (2004) Israel Observational N_{Initial}=1367, N_{Final}=1367</p>	<p>Population: <i>Traumatic Spinal Cord Injury (TSCI; n=250):</i> Mean age=34.5±15.3yr; Gender: males=5, females=0; Level of injury: cervical=37%. Thoracic=32%, lumbosacral=31%; Severity of injury: Frankel grade A=74, B=42, C=100, D=34; Time since injury=59 days.</p>	<ol style="list-style-type: none"> 1. The mean LOS was 239±168 for individuals with TSCI and 106±137 for individuals with NTSCI. 2. SCI severity, etiology and decade of admission to rehabilitation were significantly associated with LOS ($p<0.001$).

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	<p><i>Non-Traumatic Spinal Cord Injury (NTSCI; n=1117):</i> Mean age=47.1±16.8yr; Gender: male=9, female=3; Level of injury: cervical=32%, thoracic=44%, lumbosacral=24%; Severity of Injury: Frankel grade A=32, B=146, C=506, D=433. Time since injury=51mo.</p> <p>Intervention: No intervention.</p> <p>Retrospective analysis of the factors that influence hospital LOS.</p> <p>Outcome Measures: LOS, SCI etiology, SCI severity, decade of admission to rehabilitation, and Spinal Cord Independence Measure II (SCIM II).</p>	<ol style="list-style-type: none"> 3. SCIM II gains were positively associated with LOS, when LOS was short (<70 days; r=0.81-0.82, p<0.001). 4. Age had no significant effect on LOS (p=0.08).
<p>Pollard & Apple (2003) USA Case Series N_{Initial}=412, N_{Final}=95</p>	<p>Population: Mean age=not reported; Gender: not reported; Level and severity of injury: incomplete tetraplegia; Time since injury=not reported.</p> <p>Intervention: No intervention.</p> <p>Retrospective review of patients with incomplete tetraplegia to determine what patient characteristics, injury variables and management strategies are associated with improved neurological outcomes.</p> <p>Outcome Measures: Motor score, motor level sensory score, sensory level and ASIA grade.</p>	<ol style="list-style-type: none"> 1. Neurological recovery was not significantly related to gender, race, type of fracture, or mechanism of injury (p>0.05). 2. Improved motor outcomes were observed in patients <18yr (34±18) when compared to those >18yr (24±19) (p=0.002). However, no significant difference was observed in sensory scores between groups (p>0.05).
<p>Kennedy et al. (2003) UK Case Control (Inadequate control) N_{Initial}=200, N_{Final}=192</p>	<p>Population: Traumatic and non-traumatic SCI: Mean age=40.7yr; Gender: males=147, females=45; Level and severity of injury: incomplete tetraplegia=23%, complete tetraplegia=21%, complete paraplegia=34%, incomplete paraplegia=22; Mean time post-injury to admission=28.8 days.</p> <p>Intervention: No intervention. Various outcomes associated with inpatient rehabilitation focusing on goal attainment in younger versus older patients.</p> <p>Outcome Measures: Needs Assessment Checklist (NAC) collected within 2wk of mobilization and within 6wk of discharge.</p>	<ol style="list-style-type: none"> 1. Improvements were noted in ↓ "percentage to be achieved" scores for all nine areas of need (p<0.0001). No significant differences were seen between age groups. 2. Those with complete lesions showed greater improvement in bowel management than those with incomplete lesions (p<0.005) and those with tetraplegia showed greater improvement in the area of skin care than those with paraplegia group (p<0.005) Otherwise no other differences. 3. Mobility needs of older subjects were significantly higher compared to the younger subjects (p<0.005) initially, but lower for the community score (p=0.01). Higher scores (i.e., more unmet need) assessed close to discharge were noted for older versus younger for the areas of skin management (p<0.01), bladder management (p<0.01),

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		bowel management ($p < 0.05$) and mobility ($p < 0.01$).
<p>Scivoletto et al. (2003) Italy Case Control $N_{\text{Initial}}=284$, $N_{\text{Final}}=284$</p>	<p>Population: Mean age=50.4yr; Gender: males=184, females=100; Level of injury: cervical=81, thoracic=148, lumbosacral=55; Severity of injury: AIS: A-D; Mean time post-lesion to admission=56.9 days.</p> <p>Intervention: No intervention. Various outcomes associated with inpatient rehabilitation focusing on younger (<50) versus older (>50) patients. Mean LOS was 98.7±68.1 days.</p> <p>Outcome Measures: LOS, AIS, ASIA Motor Index, BI, Rivermead Mobility Index (RMI), Walking Index for SCI (WISCI), Discharge Destination. All collected at admission and discharge.</p>	<ol style="list-style-type: none"> 1. Although LOS was longer for younger patients (111.3±63.88 versus 89±69.9, $p < 0.008$) which was related to a higher incidence of incomplete lesions and etiology, a matched-block sub-analysis ($n=130$) showed differences were not significant. 2. Neurological recovery was more frequent with younger group ($p=0.006$) and for those at AIS C. Matched group sub-analysis showed more ASIA grade ($p=0.027$) and motor score improvements in younger group. 3. Gains for independence of daily living measures (BI and RMI) were significantly greater for younger group ($p < 0.001$). 4. Younger age group had more people reach independent walking levels on WISCI than in older group ($p < 0.004$). Similar findings for related subscales in BI and RMI. 5. Younger age group had more people reach autonomous bladder ($p=0.005$) and bowel control ($p=0.014$) than in older group. Similar findings for bladder subscales in BI.
<p>McKinley et al. (2002) USA Case Control $N_{\text{Initial}}=381$, $N_{\text{Final}}=183$</p>	<p>Population: Non-traumatic SCI secondary to stenosis ($n=81$) versus traumatic SCI ($n=102$) within a single centre; Matching from $N=381$ sample on paraplegia versus tetraplegia and completeness.</p> <p>Intervention: No intervention. Various outcomes associated with non-traumatic (stenosis) versus traumatic SCI rehabilitation were compared. Outcome measures were collected at admission to and discharge from rehabilitation.</p> <p>Outcome Measures: LOS, charges, Discharge rates to home, FIM (score, change and efficiency).</p>	<ol style="list-style-type: none"> 1. As compared to those with trauma (before matching), those with stenosis were significantly ($p < 0.01$): <ul style="list-style-type: none"> • Older (64.1 versus 44.4). • More likely female (38.8 versus 21.2%) • More likely to have paraplegia (69.4% versus 45.5%) • More likely to be incomplete injury (AIS C or D) (100% versus 49.3%)
<p>Seel et al. (2001) USA Case Control $N_{\text{Initial}}=180$, $N_{\text{Final}}=180$</p>	<p>Population: Traumatic SCI from United States Model Systems database: Gender: male, female, three equal ($N=60$) age groups (18-39, 40-59, >59) matched for neurological level and ASIA classification,</p>	<ol style="list-style-type: none"> 1. FIM improvement was greater for the younger and middle group than for the older group ($p < 0.001$). FIM efficiency was greater for the

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	<p>paraplegia, AIS A-D, 84% admitted within 21 days post-injury.</p> <p>Intervention: No intervention. Various outcomes associated with inpatient acute and rehabilitation care focusing on age effects by comparing results between three age categories.</p> <p>Outcome Measures: LOS, Charges, ASIA motor index score, FIM, change scores and efficiencies for FIM. All collected at admission to acute care and admission to rehabilitation care and discharge.</p>	<p>young group as compared to the 2 older groups ($p < 0.001$).</p> <ol style="list-style-type: none"> 2. There were no significant differences in ASIA motor index scores at any of the time points across the different ages. 3. No systematic significant differences were noted between the 3 age groups for acute care LOS or hospital charges. 4. Rehabilitation LOS was significantly shorter for younger than middle or older groups. There was no difference in associated hospital charges for the 3 groups. 5. All age groups were equally likely to be discharged to a private residence ($\geq 92\%$).
<p>Van der Putten et al. (2001) Netherlands Case Series $N_{\text{Initial}}=100$, $N_{\text{Final}}=100$</p>	<p>Population: <i>Non-traumatic SCI</i>: mean age=55yr; Gender: male=54%; Level of injury: cervical=49%, upper thoracic=21%, lower thoracic and lumbar=22%; Time from onset to rehabilitation=4.8yr.</p> <p>Intervention: No intervention. Optimal outcomes were regressed against various factors associated with non-traumatic rehabilitation.</p> <p>Outcome Measures: Demographics, clinical characteristics, level of lesion and AIS, FIM motor score and change score. Collected at admission to and discharge from rehabilitation.</p>	<ol style="list-style-type: none"> 1. Age (i.e., younger), etiology (i.e., hereditary pathology) and lesion level (i.e., cervical) were individually associated with improved functional outcomes but did not improve prediction of overall model.
<p>Eastwood et al. (1999) USA Case Series $N_{\text{Initial}}=5180$, $N_{\text{Final}}=3904$</p>	<p>Population: Age: <21=882, 21-30=1182, 31-40=803, 41-50=484, >50=552, unknown=1; Gender: males=3157, females=747; Level and severity of injury: paraplegia-incomplete=777, paraplegia-complete=1202, tetraplegia-incomplete=1065, tetraplegia-complete=782, unknown=78; Time since injury=not reported.</p> <p>Intervention: No intervention. Retrospective chart review of patients discharged between 1990 and 1997 with traumatic SCI to determine predictors of acute rehabilitation length of stay and their association with medical and social outcomes. Outcomes were assessed at rehabilitation discharge and one yr following injury.</p> <p>Outcome Measures: Rehabilitation LOS, age, race, method of bladder management, tetraplegia, education,</p>	<ol style="list-style-type: none"> 1. From 1990 to 1997 rehabilitation LOS declined from 74 days to 60 days, while discharge to nursing homes and rehospitalizations increased. 2. Lower FIM score at admission, year of discharge, method of bladder management, tetraplegia, race, education, marital status, discharge disposition, and age were related to longer LOS ($p < 0.05$) 3. At one yr following injury lower FIM, injury level, and age were related to the presence of pressure ulcers, rehospitalization, residence, and time spent out of residence ($p < 0.05$). 4. Of those discharged to nursing homes, 44% returned home by year one and these individuals

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	marital status, discharge disposition, one-year presence of pressure ulcers, rehospitalization, place of residence, days per week out of residence.	had higher functional status and were younger.
<p>Cifu et al. (1999) USA Case Control N_{Initial}=375, N_{Final}=375</p>	<p>Population: Traumatic SCI from United States Model Systems database: Gender: male and female, three equal (N=125) age groups (18-34, 35-64, >64) matched for neurological level and completeness, tetraplegia, AIS A-D, 85% admitted within 21 days post-injury. Intervention: No intervention. Various outcomes associated with inpatient acute and rehabilitation care focusing on age effects by comparing results between three age categories. Outcome Measures: LOS, Charges, ASIA motor index score, FIM, change scores and efficiencies for FIM and ASIA motor index, Discharge destination. All collected at admission to acute care and admission to rehabilitation care and discharge.</p>	<ol style="list-style-type: none"> 1. The younger the age group, the greater the FIM motor score improvement and greater FIM motor efficiency. 2. The younger and middle age groups had significantly greater ASIA motor index score increases and efficiency than the older age group. 3. No systematic significant differences related to age were noted for acute care or rehabilitation Length of Stay or hospital charges. 4. The older the age group, the more likely individuals would be discharged to an institutional setting.
<p>Cifu et al. (1999) USA Case Control (Inadequate control) N_{Initial}=2,169, N_{Final}=2,169</p>	<p>Population: Traumatic SCI from United States Model Systems database: Mean age =31.72yr; Gender: males =83%, females =17%; Level of injury: paraplegia; Severity of injury: AIS: A-D. Intervention: No intervention. Various outcomes associated with inpatient acute and rehabilitation care focusing on age effects by comparing results between 11 age categories. Mean acute LOS was 13.2±16.92 days. Mean rehabilitation LOS was 56.76±34.28 days. Outcome Measures: LOS, Charges, ASIA motor index score, FIM, change scores and efficiencies for FIM and ASIA motor index. All collected at admission to acute care and admission to rehabilitation care and discharge.</p>	<ol style="list-style-type: none"> 1. FIM improvement was less for people ≥60 than those younger. 2. There were no significant differences in ASIA motor index scores, change scores or efficiency scores across different ages. 3. No systematic significant differences were noted for acute care LOS or hospital charges. 4. Rehabilitation LOS was longer and associated hospital charges greater for older individuals (trend beginning for those >54 and peaking in the 60-64 age group). 5. Younger age groups were more likely injured as a result of vehicular crashes or violence while older groups were more likely injured as a result of falls or other events including being struck by falling objects, pedestrian accidents and medical/surgical complications.
<p>McKinley et al. (1999) USA Case Control N_{Initial}=4035, N_{Final}=58</p>	<p>Population: Non-traumatic SCI secondary to neoplastic cord compression admitted over 5 years (within a single centre (n=29) versus traumatic SCI (n=29) from the United States Model Systems database matched by age, level of injury</p>	<ol style="list-style-type: none"> 1. As compared to those with trauma (before matching), those with neoplastic cord compression were: <ul style="list-style-type: none"> • Older (57.8 versus 30.45).

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	<p>and AIS; Age =57.8 years; AIS A-D; C4-L2.</p> <p>Intervention: No intervention. Various outcomes associated with rehabilitation care of non-traumatic (neoplastic cord compression) versus traumatic SCI. Outcome measures were collected at admission to and discharge from rehabilitation.</p> <p>Outcome Measures: LOS, Discharge destination, FIM (total score, change and efficiency).</p>	<ul style="list-style-type: none"> • More likely to have paraplegia (88.2% versus 52.5%) • More likely to be incomplete (88.2% versus 56.7%) • No different FIM efficiency
<p>Devivo et al. (1990) USA Case control N_{Initial}=866, N_{Final}=866</p>	<p>Population: <i>Group 1 (Age=1-15yr):</i> Gender: males=80%, females=20%; Level of injury: paraplegia=47.5%, tetraplegia 52.5%; Severity of injury: complete=52.5%, incomplete=47.5%; Time since injury=not reported. <i>Group 2 (Age=16-30yr):</i> Gender: males=84.6%, females=15.4%; Level of injury: paraplegia=52.1%, tetraplegia=47.9%; Severity of injury: complete=55%, incomplete=45%; Time since injury=not reported. <i>Group 3 (Age=31-45yr):</i> Gender: males=81.1%, females=18.9%; Level of injury: paraplegia=52%, tetraplegia =48%; Severity of injury: complete=45.9%, incomplete=54.1%; Time since injury=not reported. <i>Group 4 (Age=46-60yr):</i> Gender: males=79%, females=21%; Level of injury: paraplegia=46%, tetraplegia=54%; Severity of injury: complete=43%, incomplete=57%; Time since injury=not reported. <i>Group 5 (Age=61-86yr):</i> Gender: males=70%, females=30%; Level of injury: paraplegia=28.6%, tetraplegia 71.4%; Severity of injury: complete=36.2%, incomplete=63.8%; Time since injury=not reported.</p> <p>Intervention: No intervention. Patients were retrospectively divided into five age groups: <i>Group 1 (1-15yr), Group 2 (16-30yr), Group 3 (31-45yr), Group 4 (46-60yr), Group 5 (61-86yr)</i>. Data was then used to assess the effects of age on rehabilitation outcome.</p> <p>Outcome Measures: Relationship of age with clinical outcomes.</p>	<ol style="list-style-type: none"> 1. Increase in age at admission was significantly related to increase in: <ul style="list-style-type: none"> • Cervical injuries with patients over 60 yr old (p=0.006). • Diabetes (p<0.001). • Obesity (p=0.007). • Alcohol abuse (p<0.001). • Heart disease (p<0.001). • Arthritis (p<0.001). • Pulmonary embolus (p<0.001). • Gastrointestinal hemorrhage (p=0.008). • Pneumonia (p=0.003). • Mechanical ventilatory support use (p=0.004). 2. Increase in age was significantly related to a decrease in: <ul style="list-style-type: none"> • Percentage of complete lesions (p=0.039). 3. No significant relationship was found between age at admission and: <ul style="list-style-type: none"> • Number of days from injury to admission. • Initial length of hospitalization of acute care. • Hospital charges. • Days of rehospitalization in the second year post injury. 4. Increasing age at admission was inversely related to percentage of patients independent in self-care activities at discharge (p=0.016).
<p>Yarkony et al. (1988) USA Case control</p>	<p>Population: <i>Traumatic SCI:</i> Mean age=28.3yr; Gender: males=82%, females=18%; Level and severity of injury:</p>	<ol style="list-style-type: none"> 1. Age was not significantly related to admission or discharge MBI.

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N _{Initial} =708, N _{Final} =708	<p>complete paraplegia=30%, incomplete paraplegia=15%, complete tetraplegia=27%, incomplete tetraplegia=28%.</p> <p>Intervention: No intervention. Patients were retrospectively divided into four groups: <i>Group 1 (6-19yr)</i>, <i>Group 2 (20-39yr)</i>, <i>Group 3 (40-59yr)</i>, <i>Group 4 (60-88yr)</i> and data was analyzed.</p> <p>Outcome Measures: Relationship of age to clinical outcomes.</p>	<ol style="list-style-type: none"> 2. Admission and discharge MBI was related to level of injury (p<0.001) and severity (p<0.001). 3. Increase in age in patients with complete paraplegia was related to increased dependence in seven functional skills including: bathing, upper and lower body dressing, stair climbing, and transfers to chair, toilet and bath.