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### New and Updated Cochrane Systematic Reviews

**New Reviews – November 2014**

Non-pharmacological interventions for chronic pain in people with spinal cord injury

### Journal Articles

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1. Title: A Massive Open Online Course for teaching physiotherapy students and physiotherapists about spinal cord injuries.
Citation: Spinal Cord, December 2014, vol./is. 52/12(911-8), 1362-4393;1476-5624 (2014 Dec)
Author(s): Harvey LA, Glinsky JV, Lowe R, Lowe T
Language: English
Abstract: STUDY DESIGN: A descriptive audit.OBJECTIVES: To audit the participation and satisfaction in a Massive Open Online Course (MOOC) for teaching physiotherapy students and physiotherapists about spinal cord injuries was hosted by Physiotherapy and run in partnership with the International Spinal Cord Society. The MOOC was based on the physiotherapy-specific module of www.elearnSCI.org, and also involved extra readings, activities and online discussion through a closed Facebook group. Participation and satisfaction was quantified through a pre- and post-MOOC knowledge assessment and an online course evaluation. Participation was also gauged through Facebook activity and internet-based usage statistics.RESULTS: Three thousand five hundred and twenty-three people from 108 countries registered for the MOOC and 2527 joined the Facebook group. One thousand one hundred and twenty-one completed the pre- and post-MOOC knowledge assessments, with more completing one or the other. The median (interquartile range) results for those who completed the pre and post-MOOC knowledge assessments were 70% (60-80%) and 90% (80-95%), respectively. One thousand and twenty-nine completed the online course evaluation, with more than 80% agreeing or strongly agreeing with 12 of the 13 positive statements posed to them about the course.CONCLUSION: Most participants who completed the MOOC performed well on the post-MOOC knowledge assessment and enjoyed the learning experience. However, these results may be biased if those who did not complete the MOOC were dissatisfied and/or did not sit the post-MOOC knowledge assessment.
Publication type: Journal Article
Source: MEDLINE
Full text: Available Nature Publishing Group at Spinal Cord

2. Title: A survey of protective cushion usage in individuals with spinal cord injury while traveling in a motor
Abstract: Objective: While there are specific recommendations for pressure relieving cushions when seated in a wheelchair, there is a paucity of information regarding prescribed wheelchair cushions for persons with spinal cord injury (SCI) when traveling and not in their wheelchair seat. A questionnaire was designed to ascertain if individuals with SCI who are primarily wheelchair users utilize a prescribed wheelchair cushion when traveling in a motor vehicle (MV) or on a commercial airliner, as not utilizing one may be a causative factor in developing pressure ulcers. Design and setting: Survey design in an outpatient SCI rehabilitation setting. Participants: Full-time wheelchair users, with chronic (>1 year) SCI. Results: Forty-two participants completed the survey, with a mean age of 39 years old and time post-injury of 10.4 years. All subjects used a prescribed wheelchair cushion when seated in their wheelchair. Twenty-seven subjects reported transferring to a MV seat (59.5% of sample), with 25 (92.6%) reporting not using a prescribed wheelchair cushion when sitting directly on the MV seat. For subjects who traveled on an airplane (n = 23-54.8%), 19 (82.6%) reported that they do not sit on a prescribed specialty cushion. Conclusion: Persons with chronic SCI, who are primary wheelchair users, utilize prescribed wheelchair cushions when sitting in their wheelchair, but most do not utilize a prescribed wheelchair cushion when seated in a MV (if they transfer out of their chair) or on an airplane seat. Studies to determine the pressures over the bony prominences on their travel surfaces may need to be undertaken to see whether the pressures are appropriate, as they may be a source of skin breakdown.

Publication type: Journal: Review
Source: EMBASE
Full text: Available The journal of spinal cord medicine at Journal of Spinal Cord Medicine, The

3. Title: Activity-based therapy for recovery of walking in chronic spinal cord injury: results from a secondary analysis to determine responsiveness to therapy.
Citation: Archives of Physical Medicine & Rehabilitation, December 2014, vol./is. 95/12(2247-52), 0003-9993;1532-821X (2014 Dec)
Author(s): Jones ML, Evans N, Tefertiller C, Backus D, Sweatman M, Tansey K, Morrison S
Language: English
Abstract: OBJECTIVE: To gain insight into who is likely to benefit from activity-based therapy (ABT), as assessed by secondary analysis of data obtained from a clinical trial. DESIGN: Secondary analysis of results from a randomized controlled trial with delayed treatment design. SETTING: Outpatient program in a private, nonprofit rehabilitation hospital. PARTICIPANTS: Volunteer sample of adults (N=38; 27 men; 11 women; age, 22-63y) with chronic (>12mo postinjury), motor-incomplete (American Spinal Injury Association [ASIA] Impairment Scale [AIS] grade C or D) spinal cord injury (SCI). INTERVENTIONS: A total of 9h/wk of ABT for 24 weeks including developmental sequencing; resistance training; repetitive, patterned motor activity; and task-specific locomotor training. Algorithms were used to guide group allocation, functional electrical stimulation utilization, and locomotor training progression. MAIN OUTCOME MEASURES: Walking speed and endurance (10-meter walk test and 6-minute walk test) and functional ambulation (timed Up and Go test). RESULTS: This secondary analysis identified likely responders to ABT on the basis of injury characteristics: AIS classification, time since injury, and initial walking ability. Training effects were the most clinically significant in AIS grade D participants with injuries <3 years in duration. This information, along with information about preliminary responsiveness to therapy (gains after 12wk), can help predict the degree of recovery likely from participation in an ABT program. CONCLUSIONS: ABT has the potential to promote neurologic recovery and enhance walking ability in individuals with chronic, motor-incomplete SCI. However, not everyone with goals of walking recovery will benefit. Individuals with SCI should be advised of the time, effort, and resources required to undertake ABT. Practitioners are encouraged to use the findings from this trial to assist prospective participants in establishing realistic expectations for recovery. Copyright 2014 American Congress of Rehabilitation Medicine. Published by Elsevier Inc. All rights reserved.
Publication type: Journal Article
Source: MEDLINE
Full text: Available ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION at Archives of Physical Medicine and Rehabilitation
Full text: Available ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION at Salisbury District Hospital Healthcare Library

4. Title: Activity-based therapy for recovery of walking in individuals with chronic spinal cord injury: results from a
Abstract: OBJECTIVE: To examine the effects of activity-based therapy (ABT) on neurologic function, walking ability, functional independence, metabolic health, and community participation. DESIGN: Randomized controlled trial with delayed treatment design. SETTING: Outpatient program in a private, nonprofit rehabilitation hospital. PARTICIPANTS: Volunteer sample of adults (N=48; 37 men and 11 women; age, 18-66y) with chronic (>12mo postinjury), motor-incomplete (ASIA Impairment Scale grade C or D) spinal cord injury (SCI). INTERVENTIONS: A total of 9h/wk of ABT for 24 weeks including developmental sequencing; resistance training; repetitive, patterned motor activity; and task-specific locomotor training. Algorithms were used to guide group allocation, functional electrical stimulation utilization, and locomotor training progression. MAIN OUTCOME MEASURES: Neurologic function (International Standards for Neurological Classification of Spinal Cord Injury); walking speed and endurance (10-meter walk test, 6-minute walk test, and Timed Up and Go test); community participation (Spinal Cord Independence Measure, version III, and Reintegration to Normal Living Index); and metabolic function (weight, body mass index, and Quantitative Insulin Sensitivity Check). RESULTS: Significant improvements in neurologic function were noted for experimental versus control groups (International Standards for Neurological Classification of Spinal Cord Injury total motor score [5.1±6.3 vs 0.9±5.0; P=.024] and lower extremity motor score [4.2±5.2 vs -0.6±4.2; P=.004]). Significant differences between experimental and control groups were observed for 10-meter walk test speed (0.096±0.14m/s vs 0.027±0.10m/s; P=.036) and 6-minute walk test total distance (35.97±48.2m vs 3.0±25.5m; P=.002). CONCLUSIONS: ABT has the potential to promote neurologic recovery and enhance walking ability in individuals with chronic, motor-incomplete SCI. However, further analysis is needed to determine for whom ABT is going to lead to meaningful clinical benefits. Copyright 2014 American Congress of Rehabilitation Medicine. Published by Elsevier Inc. All rights reserved.

Publication type: Journal Article
Source: MEDLINE
Full text: Available ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION at Archives of Physical Medicine and Rehabilitation
Full text: Available ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION at Salisbury District Hospital Healthcare Library

5. Title: An acute growth factor treatment that preserves function after spinal cord contusion injury
Citation: Journal of Neurotrauma, November 2014, vol./is. 31/21(1807-1813), 0897-7151;1557-9042 (01 Nov 2014)
Author(s): Chehrehasa F., Cobcroft M., Young Y.W., Mackay-Sim A., Goss B.
Language: English
Abstract: Inflammation of the spinal cord after traumatic spinal cord injury (SCI) leads to destruction of healthy tissue. This "secondary degeneration" is more damaging than the initial physical damage and is the major contributor to permanent loss of functions. In our previous study, we showed that combined delivery of two growth factors, vascular endothelial growth factor and platelet-derived growth factor, significantly reduced secondary degeneration after hemisection injury of the spinal cord in the rat. Growth factor treatment reduced the size of the lesion cavity at 30 days, compared to control animals, and further reduced the cavity at 90 days in treated animals, whereas in control animals the lesion cavity continued to increase in size. Growth factor treatment also reduced astrogliosis and reduced macroglia/macrophage activation around the injury site. Treatment with individual growth factors alone had similar effects to control treatments. The present study investigated whether growth factor treatment would improve locomotor behavior after spinal contusion injury, a more relevant pre-clinical model of SCI. The growth factors were delivered for the first 7 days to the injury site by osmotic minipump. Locomotor behavior was monitored at 1-28 days after injury using the Basso, Beattie and Bresnahan (BBB) score and at 30 days using automated gait analysis. Treated animals had BBB scores of 18; control animals scored 10. Treated animals had significantly reduced lesion cavities and reduced macroglia/macrophage activation around the injury site. We conclude that growth factor treatment preserved spinal cord tissues after contusion injury, thereby allowing functional recovery. This treatment has the potential to significantly reduce the severity of human spinal cord injuries.
Publication type: Journal: Review
Source: EMBASE

6. Title: Anti-apoptotic signal transduction mechanism of electroacupuncture in acute spinal cord injury.
OBJECTIVE: To describe the prevalence of osteoporosis and its association with functional electrical neurologic and functional status, a retrospective study.

Citation: Archives of Physical Medicine & Rehabilitation, December 2014, vol./is. 95/12(2342-9), 0003-9993;1532-821X (2014 Dec)

Author(s): Hammond ER, Metcalf HM, McDonald JW, Sadowsky CL

Language: English

Abstract: Spinal cord injury (SCI) can be caused by a variety of pathogenic factors. In China, acupuncture is widely used to treat SCI. We previously found that acupuncture can reduce apoptosis and promote repair after SCI. However, the antiapoptotic mechanisms by which acupuncture exerts its effects on SCI remain unclear. Our aim was to investigate the role of the PI3K/Akt and extracellular signal-regulated kinases (ERK)1/2 signalling pathways in acupuncture treatment of acute SCI. Eighty pure-bred New Zealand rabbits were randomly divided into the following five groups (n=16 per group): control; model; elongated needle electroacupuncture (EA); EA+LY294002; and EA+PD98059. We established a spinal cord contusion model of SCI in all experimental groups except controls, in which only a laminectomy was performed. After SCI, three of the groups received EA once daily for 3 days. One hour before SCI, the two drug groups received LY294002 (Akt inhibitor; 10 mug, 20 muL) or PD98059 (ERK inhibitor; 3 mug, 20 muL) via intrathecal injection. At 48 h after SCI, animals were killed and spinal cord tissue samples were collected for transferase dUTP nick end labelling (TUNEL) assays, immunohistochemistry and western blot assays. EA significantly increased p-Akt and p-ERK1/2 expression, reduced cytochrome c and caspase-3 expression and inhibited neuronal apoptosis in the injured spinal cord segment. The opposite effects were seen after using Akt and ERK inhibitors. Acupuncture promotes the repair of SCI, possibly by activation of the PI3K/Akt and ERK1/2 signalling pathways and by inhibition of the mitochondrial apoptotic pathway. Published by the BMJ Publishing Group Limited. For permission to use (where not already granted under a licence) please go to http://group.bmj.com/group/rights-licensing/permissions.

Publication type: Journal Article

Source: EMBASE

Full text: Available The journal of spinal cord medicine at Journal of Spinal Cord Medicine, The

7. Title: Associations with chest illness and mortality in chronic spinal cord injury

Citation: Journal of Spinal Cord Medicine, 2014, vol./is. 37/6(662-669), 1079-0268;2045-7723 (2014)

Author(s): Danilack V.A., Stolzmann K.L., Gagnon D.R., Brown R., Tun C.G., Morse L.R., Garshick E.

Language: English

Abstract: Outcome measures: Logistic regression assessing relationships with chest illness at baseline and Cox regression assessing the relationship between chest illness and mortality. Objective: Identify factors associated with chest illness and describe the relationship between chest illness and mortality in chronic spinal cord injury (SCI). Design: Cross-sectional survey assessing chest illness and a prospective assessment of mortality. Methods: Between 1994 and 2005, 430 persons with chronic SCI (mean + SD, 52.0 + 14.9 years old, and >4 years post SCI (20.5 + 12.5 years) underwent spirometry, completed a health questionnaire, and reported any chest illness resulting in time off work, indoors, or in bed in the preceding 3 years. Deaths through 2007 were identified. Results: Chest illness was reported by 139 persons (32.3%). Personal characteristics associated with chest illness were current smoking (odds ratio =2.15; 95% confidence interval =1.25-3.70 per each pack per day increase), chronic obstructive pulmonary disease (COPD) (3.52; 1.79-6.92), and heart disease (2.18; 1.14-4.16). Adjusting for age, subjects reporting previous chest illness had a non-significantly increased hazard ratio (HR) for mortality (1.30; 0.88-1.91). In a multivariable model, independent predictors of mortality were greater age, SCI level and completeness of injury, diabetes, a lower %-predicted forced expiratory volume in 1 second, heart disease, and smoking history. Adjusting for these covariates, the effect of a previous chest illness on mortality was attenuated (HR = 1.15; 0.77-1.73). Conclusion: In chronic SCI, chest illness in the preceding 3 years was not an independent risk factor for mortality and was not associated with level and completeness of SCI, but was associated with current smoking, physician-diagnosed COPD, and heart disease history.

Publication type: Journal: Review

Source: MEDLINE

Full text: Available ProQuest at Acupuncture in Medicine

Full text: Available ProQuest at Acupuncture in Medicine
PURPOSE: Recurrent urinary tract infections (UTI) are a major problem affecting spinal cord injury (SCI) patients and may stem from chronic bacterial prostatitis. We have therefore investigated the presence of chronic bacterial prostatitis and its role in the development of recurrent symptomatic UTI in SCI men. 

METHODS: This study is a prospective cross-sectional investigation of bacterial prostatitis in SCI men in a single SCI rehabilitation center. In 50 men with chronic SCI presenting for a routine urologic examination, urine samples before and after prostate massage were taken for microbiologic investigation and white blood cell counting. Furthermore, patient characteristics, bladder diary details, and the annual rate of symptomatic UTI were collected retrospectively.

RESULTS: No participant reported current symptoms of UTI or prostatitis. In most men (39/50, 78%), the microbiologic analysis of the post-massage urine sample revealed growth of pathogenic bacteria. The majority of these men (32/39, 82%) also presented with mostly (27/39, 69%) the same pathogenic bacteria in the pre-massage sample. There was no significant (p = 0.48) difference in the number of symptomatic UTI in men with a positive post-massage culture compared with those with a negative culture. No significant (p = 0.67) difference in the frequency of bladder symptoms was reported in men with a positive post-massage culture compared with those with a negative culture.

CONCLUSIONS: FES cycling ergometry may be associated with a decreased loss of bone mass after paralysis. Further prospective examination of the role of FES in preserving bone mass will improve our understanding of this association. Copyright 2014 American Congress of Rehabilitation Medicine. Published by Elsevier Inc. All rights reserved.
distribution of positive versus negative post-massage cultures was detected between men with recurrent and sporadic UTI. CONCLUSIONS: Most SCI men are affected by asymptomatic bacterial prostatitis; however, bacterial prostatitis does not play a major role in the development of recurrent UTI. The indication for antibiotic treatment of chronic bacterial prostatitis in asymptomatic SCI men with recurrent UTI is questionable.

Publication type: Journal Article
Source: MEDLINE

11. Title: Cortical reorganization after spinal cord injury: Always for good?
Citation: Neuroscience, December 2014, vol./is. 283/(78), 0306-4522;1873-7544 (December 06, 2014)
Author(s): Moxon K.A., Oliviero A., Aguilar J., Foffani G.
Language: English
Abstract: Plasticity constitutes the basis of behavioral changes as a result of experience. It refers to neural network shaping and re-shaping at the global level and to synaptic contacts remodeling at the local level, either during learning or memory encoding, or as a result of acute or chronic pathological conditions. ‘Plastic’ brain reorganization after central nervous system lesions has a pivotal role in the recovery and rehabilitation of sensory and motor dysfunction, but can also be "maladaptive". Moreover, it is clear that brain reorganization is not a "static" phenomenon but rather a very dynamic process. Spinal cord injury immediately initiates a change in brain state and starts cortical reorganization. In the long term, the impact of injury - with or without accompanying therapy - on the brain is a complex balance between supraspinal reorganization and spinal recovery. The degree of cortical reorganization after spinal cord injury is highly variable, and can range from no reorganization (i.e. "silencing") to massive cortical remapping. This variability critically depends on the species, the age of the animal when the injury occurs, the time after the injury has occurred, and the behavioral activity and possible therapy regimes after the injury. We will briefly discuss these dependencies, trying to highlight their translational value. Overall, it is not only necessary to better understand how the brain can reorganize after injury with or without therapy, it is also necessary to clarify when and why brain reorganization can be either "good" or "bad" in terms of its clinical consequences. This information is critical in order to develop and optimize cost-effective therapies to maximize functional recovery while minimizing maladaptive states after spinal cord injury.
Publication type: Journal: Review
Source: EMBASE

12. Title: Effect of tilt and recline on ischial and coccygeal interface pressures in people with spinal cord injury.
Citation: American Journal of Physical Medicine & Rehabilitation, December 2014, vol./is. 93/(12), 1019-30, 0894-9115;1537-7385 (2014 Dec)
Author(s): Chen Y, Wang J, Lung CW, Yang TD, Crane BA, Jan YK
Language: English
Abstract: OBJECTIVE: Clinicians commonly recommend that power wheelchair users with spinal cord injury perform wheelchair tilt and recline maneuvers to redistribute seating loads away from the ischial tuberosities. However, ischial pressure reduction may be accompanied by coccygeal pressure increases. Although the coccyx is among the most common sites of pressure ulcers, few studies have reported coccygeal interface pressure. The purpose of this study was to investigate both ischial and coccygeal interface pressures in response to changes in wheelchair tilt and recline angles.DESIGN: Thirteen power wheelchair users were recruited into this study. Six combinations of wheelchair tilt (15, 25, and 35 degrees) and recline (10 and 30 degrees, corresponding to traditional recline conventions of 100 and 120 degrees, respectively) angles were tested in random order. Each combination was tested with 5 mins of upright sitting, 5 mins of tilt and recline, as well as 5 mins of maximal pressure relief recovery. Peak pressure indices were calculated at the ischial and coccygeal sites.RESULTS: Ischial pressures monotonically decreased in response to increasing combinations of tilt and recline. Increments of 15 degrees of tilt did not produce significant differences under either recline angle, whereas increments of 25 degrees of tilt produced significant differences under both recline angles. Coccygeal pressures increased in response to the four smallest (of six) combinations of tilt and recline, whereas they decreased in response to the largest two combinations.CONCLUSIONS: Ischial pressures seemed to be redistributed to the coccyx in response to the four smallest angle combinations and redistributed to the back support in response to the two largest angle combinations. Future work should confirm this pressure redistribution to the back support and determine the back support locations of redistribution.
Publication type: Journal Article
Source: MEDLINE
Full text: Available American journal of physical medicine & rehabilitation / Association of Academic Physiatrists at American Journal of Physical Medicine and Rehabilitation
13. Title: Effects of spinal cord injury on body composition and metabolic profile - Part I
Citation: Journal of Spinal Cord Medicine, 2014, vol./is. 37(6)(937-702), 1079-0268;2045-7723 (2014)
Author(s): Gorgey A.S., Dolbow D.R., Dolbow J.D., Khalil R.K., Castillo C., Gater D.R.
Language: English
Abstract: Several body composition and metabolic-associated disorders such as glucose intolerance, insulin resistance, and lipid abnormalities occur prematurely after spinal cord injury (SCI) and at a higher prevalence compared to able-bodied populations. Within a few weeks to months of the injury, there is a significant decrease in total lean mass, particularly lower extremity muscle mass and an accompanying increase in fat mass. The infiltration of fat in intramuscular and visceral sites is associated with abnormal metabolic profiles. The current review will summarize the major changes in body composition and metabolic profiles that can lead to comorbidities such as type 2 diabetes mellitus and cardiovascular diseases after SCI. It is crucial for healthcare specialists to be aware of the magnitude of these changes. Such awareness may lead to earlier recognition and treatment of metabolic abnormalities that may reduce the co-morbidities seen over the lifetime of persons living with SCI.
Publication type: Journal: Review
Source: EMBASE
Full text: Available The journal of spinal cord medicine at Journal of Spinal Cord Medicine, The

14. Title: Exercise equipment preferences among adults with spinal cord injury.
Citation: Spinal Cord, December 2014, vol./is. 52(12)(874-9), 1362-4393;1476-5624 (2014 Dec)
Author(s): Pelletier CA, Ditor DS, Latimer-Cheung AE, Warburton DE, Hicks AL
Language: English
Abstract: STUDY DESIGN: Cross-sectional.OBJECTIVES: To evaluate exercise equipment preferences and compare cardiometabolic demand for passive hybrid and arm-only exercise among adults with paraplegia (PP) and those with tetraplegia (TP).SETTING: Four community exercise programmes.METHODS: Thirty-six adults (mean age: 41.1+12.1 years) with chronic (11.4-10.7 years post injury) TP (C3-C8; n=17) or PP (T3-T12; n=19) were recruited. Participants completed 20 min of submaximal aerobic exercise at moderate to vigorous intensity on four types of aerobic exercise equipment: arm cycle ergometer (ACE), arm glider (AG), arm-leg recumbent stepper (ALRS), and arm-leg cycle ergometer (ALCE). Participants also completed 3 sets of 10 repetitions of resistance exercise using wall pulleys (WP) and weight stack (WS) equipment. A questionnaire was administered to evaluate equipment preference. Heart rate (HR) and oxygen uptake (VO2) were measured in a subset of participants (n=9) during submaximal aerobic exercise.RESULTS: Arm-only exercise modes were perceived as being safer than passive hybrid exercise modes. There were no differences in perceived enjoyment between equipment types and groups. There were significant group but not equipment differences in HR (TP: 101.4 bpm; PP: 124.9 bpm) and VO2 (TP: 6.5ml/kg(-1)*min(-1); PP: 10.5ml/kg(-1)*min(-1)) during submaximal aerobic exercise.CONCLUSION: In this cross-community assessment of exercise equipment preferences after spinal cord injury (SCI), arm-only exercise modes were perceived as safer than hybrid exercise modes and there were no differences between equipment types in physiological responses.
Publication type: Journal Article
Source: MEDLINE
Full text: Available Nature Publishing Group at Spinal Cord

15. Title: Feasibility of using training cases from International Spinal Cord Injury Core Data Set for testing of International Standards for Neurological Classification of Spinal Cord Injury items.
Citation: Spinal Cord, December 2014, vol./is. 52(12)(919-22), 1362-4393;1476-5624 (2014 Dec)
Author(s): Liu N, Hu ZW, Zhou MW, Biering-Sorensen F
Language: English
Abstract: STUDY DESIGN: Descriptive comparison analysis.OBJECTIVE: To evaluate whether five training cases of International Spinal Cord Injury Core Data Set (ISCICDS) are appropriate for testing the facts within the International Standards for Neurological Classification of Spinal Cord Injury (ISNCSCLI and could thus be used for testing its training effectiveness.METHODS: The authors reviewed the five training cases from the ISCICDS and determined the sensory level (SL), motor level (ML) and American Spinal Injury Association Impairment Scale (AIS) for the training cases. The key points from the training cases were compared with our interpretation of the key aspects of the ISNCSCLI.RESULTS: For determining SL, three principles of ML, sacral sparing, complete injury, classification of AIS A, B, C and D, determining motor incomplete status through sparing of motor function more than three levels below the ML, there are corresponding case scenarios in ISCICDS. However, no case scenario shows classification of AIS E and the use of voluntary anal sphincter contraction for determination of motor incomplete status. Neurological level of injury could be deduced from the SL and ML. Finally, none of the cases include information about zone of partial preservation,
sensory score or motor score. CONCLUSION: Majority of the facts related to SL, ML and AIS are included in the five training cases of ISICIDS. Thus, using these training cases, it is feasible to test the above facts within the ISNCSCI. It is suggested that the missing fact should be included in an update of the training cases.

**Publication type:** Journal Article  
**Source:** MEDLINE  
**Full text:** Available [Nature Publishing Group](https://www.nature.com) at [Spinal Cord](https://www.spinalcord.com)

16. Title: Grieving my broken body: an autoethnographic account of spinal cord injury as an experience of grief.  
**Citation:** Disability & Rehabilitation, 2014, vol./is. 36/21(1823-9), 0963-8288;1464-5165 (2014)  
**Author(s):** Clifton S  
**Language:** English  
**Abstract:** PURPOSE: For good reason, the trajectory of contemporary research and therapy into rehabilitation following spinal cord injury (SCI) has moved away from focusing on the pathology of depression, to highlight the contribution of resiliency, optimism, and hope to long-term well-being. This article complements this literature, exploring the analogous links between the losses of SCI and the experiences of the grief that accompanies the death of a loved one. METHOD: The article uses autoethnography, drawing on the authors' writing about his own experiences as a C5 (incomplete) quadriplegic, to identify a correlation between the stages/symptoms of grief and the journey of rehabilitating from an SCI. RESULTS: The article highlights the "wild" and ambiguous reality of adjusting to an SCI, and so challenges the dualist tendency to assume that people are either resilient or weak, successful or unsuccessful in their recovery. It recognises that adjusting to an SCI involves complex swings in emotion—sadness, anger, and melancholy, alongside hope and determination. CONCLUSION: Drawing on strategies of grief therapy, the article suggests that constructing and reconstructing the story of one's own life is essential to learning to accept and live with an SCI. IMPLICATIONS FOR REHABILITATION: Since the losses accompanying SCI are analogous to grief, grief therapy strategies that recognise the complex and ambiguous nature of recovery can be part of rehabilitation. Therapy should encourage people to construct and reconstruct narratives—life stories—that help them mourn their loss and make sense of their new lives. The loss of an SCI is especially potent following return to the community, so storied therapy should continue beyond the period of the in-house rehabilitation.

**Publication type:** Journal Article  
**Source:** MEDLINE

17. Title: Impact of pressure ulcers on individuals living with a spinal cord injury.  
**Citation:** Archives of Physical Medicine & Rehabilitation, December 2014, vol./is. 95/12(2312-9), 0003-9993;1532-821X (2014 Dec)  
**Author(s):** Lala D, Dumont FS, Leblond J, Houghton PE, Noreau L  
**Language:** English  
**Abstract:** OBJECTIVE: To describe the impact of pressure ulcers on the ability to participate in daily and community activities, health care utilization, and overall quality of life in individuals living with spinal cord injury (SCI). DESIGN: Cross-sectional study. SETTING: Nationwide survey. PARTICIPANTS: Participants (N=1137) with traumatic SCI who were >1 year postinjury and living in the community were recruited. Of these, 381 (33.5%, 95% confidence interval, 30.8%-36.3%) had a pressure ulcer over the last 12 months. INTERVENTIONS: Not applicable. MAIN OUTCOME MEASURES: Measures developed for the Rick Hansen Spinal Cord Injury Registry Community Follow-up Survey Version 2.0. RESULTS: Of the 381 individuals with pressure ulcers, 65.3% reported that their pressure ulcer reduced their activity to some extent or more. Pressure ulcers reduced the ability of individuals with SCI to participate in 19 of 26 community and daily activities. Individuals with 1 or 2 pressure ulcers were more dissatisfied with their ability to participate in their main activity than those without pressure ulcers (P=.0077). Pressure ulcers were also associated with a significantly higher number of consultations with family doctors, nurses, occupational therapists, and wound care nurses/specialists (P<.05). CONCLUSIONS: Pressure ulcers have a significant impact on the daily life of individuals with SCI. Our findings highlight the importance of implementing pressure ulcer prevention and management programs for this high-risk population and require the attention of all SCI-related health care professionals. Copyright 2014 American Congress of Rehabilitation Medicine. Published by Elsevier Inc. All rights reserved.  
**Publication type:** Journal Article  
**Source:** MEDLINE  
**Full text:** Available [ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION](https://www.archives-phm-rehabilitation.com) at [Archives of Physical Medicine and Rehabilitation]  
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18. Title: Influence of different rehabilitation therapy models on patient outcomes: Hand function therapy in individuals with incomplete SCI
Citation: Journal of Spinal Cord Medicine, 2014, vol./is. 37/6(734-743), 1079-0268;2045-7723 (2014)
Author(s): Kapadia N.M., Bagher S., Popovic M.R.
Language: English
Abstract: Outcome measures: We analyzed the functional independence measure (FIM) and the spinal cord independence measure (SCIM) self-care sub-scores.
Results: The mean change scores on the FIM self-care sub-score for the COT1, COT2, and FES + COT groups were 12.8, 10, and 20.1 points, respectively. Similarly, the mean change scores on the SCIM self-care sub-score for the COT1, COT2, and FES + COT groups were 2.6, 3.16, and 10.2 points, respectively.
Conclusion: Increased rehabilitation intensity alone may not always be beneficial. The type of intervention plays a significant role in determining functional changes. In this instance, receiving one (COT1) or two (COT2) doses of COT resulted in similar outcomes, however, FES + COT therapy yielded much better outcomes compared to COT1 and COT2 interventions.
Objectives: The primary objective was to compare the benefits of single (COT1) versus double (COT2) dose of conventional occupational therapy (COT) in improving voluntary hand function in individuals with incomplete, sub-acute C3-C7 spinal cord injury (SCI). The secondary objective was to compare these two interventions versus functional electrical stimulation therapy plus COT (FES + COT).
Design: Retrospective analysis.
Setting: Inpatient spinal cord rehabilitation center, Toronto. Participants: Individuals with traumatic incomplete sub-acute SCI.
Interventions: Data from Phases I and II (ClinicalTrials.gov ID NCT00221117) randomized control trials were pooled together for the purpose of this study. Participants in the COT1 group received 45 hours of therapy, the COT2 group received 80 hours of therapy, and the FES + COT group received 40 hours of COT therapy +40 hours of FES therapy.
Publication type: Journal: Article
Source: EMBASE
Full text: Available The journal of spinal cord medicine at Journal of Spinal Cord Medicine, The

19. Title: Inter-rater reliability of modified modified ashworth scale in the assessment of plantar flexor muscle spasticity in patients with spinal cord injury.
Citation: Physiotherapy Research International, December 2014, vol./is. 19/4(231-7), 1358-2267;1471-2865 (2014 Dec)
Author(s): Mishra C, Ganesh GS
Language: English
Abstract: INTRODUCTION: Spasticity occurs in disorders of the central nervous system such as stroke, spinal cord injury (SCI), multiple sclerosis and traumatic brain injury. The recently developed clinical measurement for the measurement of spasticity is the Modified Modified Ashworth Scale (MMAS) PURPOSE OF STUDY: The purpose of this study is to determine the inter-rater reliability of the MMAS in the assessment of plantar flexor spasticity in patients with SCI.
METHODOLOGY: Thirty-eight subjects (32 males and six females, mean age 31.9±12.6years) were recruited for the study. Excluded from the study were patients with contracture in the lower limb and where passive movements were contraindicated.
PROCEDURE: Each patient was assessed by two raters in a single session. After the performance of the procedure by the first assessor and rating of the patient's muscle tone with the MMAS, the same procedure was repeated by the second assessor after 1hour. The evaluation was carried out in side-lying position.
The extent of agreement was analysed by non-weighted Cohen kappa.
RESULTS: The agreement between the raters was good (soleus - k: 0.75, SE=0.084, p<0.0001, gastrocnemius - k:0.70, SE=0.105, p<0.0001).
CONCLUSION: The MMAS has good inter-rater reliability in the assessment of plantar flexor muscle spasticity in patients with SCI.
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Publication type: Journal Article
Source: MEDLINE

20. Title: Magnetic resonance imaging predictors for respiratory failure after cervical spinal cord injury.
Citation: Clinical Neurology & Neurosurgery, November 2014, vol./is. 126/(30-4), 0303-8467;1872-6968 (2014 Nov)
Author(s): Huang YH, Ou CY
Language: English
Abstract: BACKGROUND: Patients after cervical spinal cord injury (CSCI) may experience ventilator-dependent respiratory failure during the acute hospitalization period. The aim of the study is to identify imaging factors that predict respiratory failure after acute CSCI.
MATERIALS AND METHODS: We enrolled 108 patients diagnosed with CSCI in 4 years. The definition of respiratory failure consisted of the requirement of a definitive airway and the assistance of mechanical ventilation. Objective neurological function was determined using the classification of the
American Spinal Injury Association (ASIA). We evaluated the characteristics of magnetic resonance imaging (MRI) of the cervical spine.

**RESULTS:** Respiratory failure occurred in 8 (7.40%) of 108 CSCI patients. The ASIA classification of the 108 patients were A (6), B (3), C (60), D (27), and E (12), and the 8 respiratory failure patients were A (3), B (1), and C (4). Seven of 8 patients with respiratory failure and 78 of 100 patients without respiratory failure had a neurological level of C5 or above by the ASIA standards (p=1.000). The imaging level of injury at C3 by MRI was identified in 5 of 8 patients that developed respiratory failure and more frequent than injury at the lower cervical levels (p<0.001). The presence of spinal cord edema was another predictor of respiratory failure (p=0.009).

**CONCLUSION:** MRI can accurately localize CSCI and identify those patients at risk of respiratory failure. Imaging level of injury at C3 and presence of spinal cord edema are both predictors. To prevent secondary cord injury from prolonged hypoxia and facilitate pulmonary care, definitive airways should be established early in high risk patients. Copyright 2014 Elsevier B.V. All rights reserved.

**Publication type:** Journal Article  
**Source:** MEDLINE

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21. **Title:** Modulating inflammatory cell responses to spinal cord injury: All in good time  
**Citation:** Journal of Neurotrauma, November 2014, vol./is. 31/21(1753-1766), 0897-7151;1557-9042 (01 Nov 2014)  
**Author(s):** Bowes A.L., Yip P.K.  
**Language:** English  
**Abstract:** Spinal cord injury can have a range of debilitating effects, permanently impacting a patient’s quality of life. Initially thought to be an immune privileged site, the spinal cord is able to mount a timely and well organized inflammatory response to injury. Intricate immune cell interactions are triggered, typically consisting of a staggered multiphasic immune cell response, which can become deregulated if left unchecked. Although several immunomodulatory compounds have yielded success in experimental rodent spinal cord injury models, their translation to human clinical studies needs further consideration. Because temporal differences between rodent and human inflammatory responses to spinal cord injury do exist, drug delivery timing will be a crucial component in recovery from spinal cord injury. Given too early, immunomodulatory therapies may impede beneficial inflammatory reactions to the injured spinal cord or even miss the opportunity to dampen delayed harmful autoimmune processes. Therefore, this review aims to summarize the temporal inflammatory response to spinal cord injury, as well as detailing specific immune cell functions. By clearly defining the chronological order of inflammatory events after trauma, immunomodulatory drug delivery timing can be better optimized. Further, we compare spinal cord injury-induced inflammatory responses in rodent and human studies, enabling clinicians to consider these differences when initiating clinical trials. Improved understanding of the cellular immune response after spinal cord injury would enhance the efficacy of immunomodulatory agents, enabling combined therapies to be considered.  
**Publication type:** Journal: Review  
**Source:** EMBASE

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22. **Title:** Psychological therapies for the management of co-morbid depression following a spinal cord injury: A systematic review.  
**Citation:** Journal of Health Psychology, December 2014, vol./is. 19/12(1597-612), 1359-1053;1461-7277 (2014 Dec)  
**Author(s):** Perkes SJ, Bowman J, Penkala S  
**Language:** English  
**Abstract:** The evidence about psychological therapies used to manage co-morbid depression after a spinal cord injury is presented here. A comprehensive search of five electronic databases identified nine studies (participants, n = 591) meeting inclusion criteria. Pooled statistical analyses were conducted in combination with narrative synthesis. Overall, multimodal cognitive behavioural therapy was found to be moderately effective (standardised mean difference = -0.52; 95% confidence interval = -0.85, -0.19). Activity scheduling, psychoeducation, problem solving and cognitive therapy may be particularly beneficial therapies within cognitive behavioural therapy. Further high-quality randomised controlled trials are needed to better substantiate these findings. The Author(s) 2013.  
**Publication type:** Journal Article  
**Source:** MEDLINE

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23. **Title:** Recovery of golfing ability in someone with an incomplete spinal cord injury: a case report.  
**Citation:** Disability & Rehabilitation, 2014, vol./is. 36/24(2101-6), 0963-8288;1464-5165 (2014)  
**Author(s):** Moriello G, Cole RE, Ryan BP, Schuck AR, Swift SR  
**Language:** English  
**Abstract:** UNLABELLED: Abstract Purpose: The purpose of this case report was to describe the elements needed to play golf, detail a rehabilitation program designed to teach someone with an incomplete spinal cord injury (SCI) to
play golf and to document outcomes of such a program.METHODS: The participant was a 58-year-old male who sustained an incomplete C3-C6 SCI. The program was divided into three phases. Phase one (nine sessions) consisted of balance, strengthening and flexibility activities to prepare him to play golf. During phase two (12 sessions), he practiced his golf swing in a clinical setting and in phase three (seven sessions) focused on task-oriented training at a golf course. The ability to play golf, putting accuracy, driving distance, quality of swing, balance, physical functioning, walking capacity, muscle strength, endurance and quality of life were measured before and after the intervention.RESULTS: The participant was able to complete 9-holes of golf with assistance and demonstrated greater ability to drive the ball with better quality of swing. Improvements were observed in balance, physical functioning, walking capacity, endurance and quality of life but not in overall strength or putting accuracy.CONCLUSIONS: This individual was able to return to golf following an intense rehabilitation program even though he required an assistive device to walk. Implications for Rehabilitation Individuals with spinal cord injury often have impairments which make participation in leisure activities more difficult. Participation in leisure activities has been associated with better subjective well being and quality of life. Rehabilitation therapists should consider creating leisure goals with their patients.

**Publication type:** Journal Article  
**Source:** MEDLINE

24. **Title:** Reference fitness values in the untrained spinal cord injury population.  
**Citation:** Archives of Physical Medicine & Rehabilitation, December 2014, vol./is. 95/12(2272-8), 0003-9993;1532-821X (2014 Dec)  
**Author(s):** Simmons OL, Kressler J, Nash MS  
**Language:** English  
**Abstract:** OBJECTIVE: Establish reference values of cardiorespiratory fitness applicable to the general, untrained spinal cord injury (SCI) population. DESIGN: Data were retroactively obtained from 12 studies (May 2004 to May 2012). SETTING: An institution-affiliated applied physiology research laboratory. PARTICIPANTS: A total of 153 men and 26 women (age, 18-55y) with chronic SCI (N=179) were included. Participants were not involved in training activities for 1 or more months before testing and were able to complete a progressive resistance exercise test to determine peak oxygen consumption (Vo2peak). INTERVENTIONS: Not applicable. MAIN OUTCOME MEASURE: Percentile ranking (poor<20%; fair; 20%-40%; average, 40%-60%; good, 60%-80%; excellent, 80%-100%) used to establish reference values. RESULTS: Reference cardiorespiratory fitness values based on functional classification as paraplegic or tetraplegic were established (paraplegic: median, 16.0mLkg(-1)min(-1); range, 1.4-35.2mLkg(-1)min(-1); tetraplegic: median, 8.8mLkg(-1)min(-1); range, 1.5-21.5mLkg(-1)min(-1)) for untrained men and women. For the primary outcome measure (Vo2peak), persons with paraplegia had significantly higher values than did persons with tetraplegia (P<.001). Although men had higher values than did women, these differences did not reach significance (P=.256). Regression analysis revealed that motor level of injury was associated with 22.3% of the variability in Vo2peak (P<.001), and an additional 8.7% was associated with body mass index (P<.001). No other measure accounted for additional significant variability. CONCLUSIONS: Established reference fitness values will allow investigators/clinicians to stratify the relative fitness of subjects/patients from the general SCI population. Key determinants are motor level of injury and body habitus, yet most variability in aerobic capacity is not associated with standard measures of SCI status or demographic characteristics. Copyright 2014 American Congress of Rehabilitation Medicine. Published by Elsevier Inc. All rights reserved.

**Publication type:** Journal Article  
**Source:** MEDLINE

25. **Title:** Resilience in the initial year of caregiving for a family member with a traumatic spinal cord injury.  
**Citation:** Journal of Consulting & Clinical Psychology, December 2014, vol./is. 82/6(1072-86), 0022-006X;1939-2117 (2014 Dec)  
**Author(s):** Elliott TR, Berry JW, Richards JS, Shewchuk RM  
**Language:** English  
**Abstract:** OBJECTIVE: Individuals who assume caregiving duties for a family member disabled in a traumatic injury often exhibit considerable distress, yet few studies have examined characteristics of those who may be resilient in the initial year of caregiving. Reasoning from the influential Pearlin model of caregiving (Pearlin & Aneshensel, 1994) and the resilience process model (Bonanno, 2005), we expected a significant minority of caregivers would be chronically distressed and another group would be resilient throughout the inaugural year of caregiving for a person with a traumatic spinal cord injury (SCI), and these groups would differ significantly in primary and secondary stress and in personal resources and mediators. METHOD: Twenty men and 108 women who identified as caregivers for a family member who incurred a traumatic SCI consented to complete measures during the inpatient rehabilitation
and at 1 month, 6 months, and 12 months postdischarge. RESULTS: Latent growth mixture modeling of depression symptoms over time revealed 3 groups of caregivers: chronic (24%), recovery (24%) and resilient (48%). The chronic group reported more anxiety, negative affect, and ill health than the other 2 groups throughout the year. The resilient group was best characterized by their enduring levels of positive affect and supportive social networks. CONCLUSIONS: A large percentage of individuals are resilient in the initial year of caregiving, and those who have problems adapting exhibit significant distress soon following the traumatic event. Early detection of and psychological interventions for individuals who have difficulty adjusting are indicated, as their distress is unlikely to abate untreated over the year. (PsycINFO Database Record (c) 2014 APA, all rights reserved).

**Publication type:** Journal Article  
**Source:** MEDLINE

26. **Title:** Resistive inspiratory muscle training in people with spinal cord injury during inpatient rehabilitation: a randomized controlled trial.  
**Citation:** Physical Therapy, December 2014, vol./is. 94/12(1709-19), 0031-9023;1538-6724 (2014 Dec)  
**Author(s):** Postma K, Haisma JA, Hopman MT, Bergen MP, Stam HJ, Bussmann JB  
**Language:** English  
**Abstract:** BACKGROUND: People with spinal cord injury (SCI) may benefit from resistive inspiratory muscle training (RIMT). Current evidence is weak, and little is known about the effect on functional outcomes and long-term effects. OBJECTIVE: The purpose of this study was to assess immediate and long-term effects of RIMT in people with SCI. DESIGN: This was a single-blinded randomized controlled trial. SETTING: The study was conducted at 4 specialized SCI units in the Netherlands. PATIENTS: The study participants were 40 people with SCI (15 with motor complete tetraplegia, 16 with incomplete tetraplegia, 8 with motor complete paraplegia, and 1 with incomplete paraplegia) who had impaired pulmonary function and were admitted for initial inpatient rehabilitation. INTERVENTION: Study participants were randomized to an RIMT group or a control group. All participants received usual rehabilitation care. In addition, participants in the intervention group performed RIMT with a threshold trainer. MEASUREMENTS: Measurements were performed at baseline, after 8 weeks of intervention, 8 weeks later, and 1 year after discharge from inpatient rehabilitation. Primary outcome measures were: respiratory muscle function, lung volumes and flows, and perceived respiratory function. Secondary outcome measures concerned patient functioning, which included health-related quality of life, limitations in daily life due to respiratory problems, and respiratory complications. RESULTS: During the intervention period, maximum inspiratory pressure (MIP) improved more in the RIMT group than in the control group (11.7 cm H2O, 95% confidence interval=4.3 to 19.0). At follow-up, this effect was no longer significant. No effect on other primary or secondary outcome measures was found except for an immediate effect on mental health. LIMITATIONS: The sample size was insufficient to study effects on respiratory complications. CONCLUSIONS: Resistive inspiratory muscle training has a positive short-term effect on inspiratory muscle function in people with SCI who have impaired pulmonary function during inpatient rehabilitation. 2014 American Physical Therapy Association.  
**Publication type:** Journal Article  
**Source:** MEDLINE  
**Full text:** Available Highwire Press at Physical Therapy

27. **Title:** Sexual Dysfunction in Male Spinal Cord Injury Patients  
**Citation:** Current Bladder Dysfunction Reports, November 2014, vol./is. 9/4(268-274), 1931-7212;1931-7220 (27 Nov 2014)  
**Author(s):** DeRoo E.M., Mellon M.J.  
**Language:** English  
**Abstract:** Spinal cord injury (SCI) patients pose complex urologic management challenges. Not only is neurogenic bowel/bladder oversight required of urologists, but also sexual dysfunction as well. These patients with SCI are frequently encountered in clinical practice, but a significant number of physicians are not knowledgeable about the set of guidelines available for clinical management. In this review, we discuss the pathophysiology behind sexual dysfunction and fertility in SCI patients, the thorough clinical evaluation required, and the many treatment options available to this specific patient population.  
**Publication type:** Journal: Review  
**Source:** EMBASE
Introduction

1. A National Association for Medical Direction of Respiratory Care (NAMDRD) Consensus Conference suggested that 20% of such patients had neurological disease.2 The incidence of respiratory failure following acute cervical spinal cord injury (ASCI) ranges between 22.6% and 57% and the average time to wean from ventilator support was found to be 36 days. Weaning for such patients should therefore take place in an intermediate care facility and be slow paced.2 Previous data from our unit did suggest a successful wean in about 70% of patients admitted to this regional spinal injury unit.1 We therefore wanted to review our recent results (Nov 2009 - Nov 2012) with previous standards. Methods We performed a retrospective review of all patients admitted from November 2009 to November 2012 for respiratory weans following spinal cord insult. Results 43 patients (35 male and 8 female) were admitted to the spinal critical care unit for weaning (14.33 patients per year). Average age was 54.7 years for male and 55.4 years for females. The level of injury is illustrated in the table below: Of the 43 patients, 35 were successfully weaned; the rest were either partially weaned or not weaned. 7 of the 10 Level C1-3 injury patients were not weaned or were only partially weaned. The remaining 3 patients of Level C1-3 injury (incomplete) were weaned. 1 patient with Level C6 injury was only partially weaned but was 77 years of age. Conclusions Review of the period from 2009-2012 is very encouraging, suggesting weaning success in line with national and international centres. Further reviews will focus on duration of wean and the effect of co-morbidities and age on the weaning outcome. Further attention needs to focus on quality of life in the weaned and not weaned patients.
STUDY DESIGN: Descriptive.OBJECTIVE: To determine the wheelchair appropriateness in patients with spinal cord injury (SCI).SETTING: National Rehabilitation Center in Ankara, Turkey.METHODS: Twenty-seven (25 male, 2 female) SCI patients were included. Demographic and clinical characteristics of the patients were noted. All wheelchairs were evaluated considering each part (seat length, seat depth, seat height, back height, armrest, headrest, wheels and seat belt) by a physiatrist who had attended the wheelchair-training course. The wheelchair was declared as inappropriate if at least three parts of wheelchair were not appropriate.RESULTS: The mean age of the patients was 32.9±9.3 years and mean duration of wheelchair use was 19.63±23.02 months. Among the patients, 21 (77.8%) were American Spinal Injury Association Impairment Scale (AIS) A, 4 (3.7%) AIS B, 1 (3.7%) AIS C and 1 (3.7%) AIS D. Five (18.5%) wheelchairs were motorized and 22 (81.5%) were manual. Overall, 15 (55.6%) wheelchairs were inappropriate. Seat height, cushion and back height were the most common inappropriate parts.CONCLUSION: In light of our first and preliminary results, we can argue that 55% of the patients with SCI use inappropriate wheelchairs. In order to achieve better mobility; personally designed wheelchairs should be prescribed by the clinicians.

Drug found to help repair spinal cord injuries
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