



001

MOTIVATION AND BARRIERS TO SPORT PARTICIPATION FOR ADULT AMPUTEES

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Hypothesis: To examine motivation, access and barriers to sports for adult amputee

Methods: A semi-structured interview involved 10 adult amputees. Data collected included pain and health questionnaire, current and previous activities, mentors, home support and barriers.

Demographics:

Sex: 8 male 2 female

Level Amputee: 6 transtibial, 2 transfemoral, 1 partial hand, 1 wrist disarticulation

Ages: 15-64 years (mean 18.6 years)

Reason Amputee: 4 MVA, 1 water-ski, 2 farm, 3 worksite

Mean time amputee: 18.6 years

Results:

Motivation-2 types:

1. universal: health benefits, social, stress relief
2. unique: challenge, self-esteem, body image, freedom

Access- 2 types:

1. Predisposing factors: patient character, injury and recovery, role models
2. Enabling factors: limb design, mentors, organized sport and family

Barriers- 3 types:

1. physical: limb limitations, stump problems, training issues
2. psychosocial: embarrassment
3. societal: lack of organized sport, lack of training, cost, work hours

Conclusion:

1. Amputee history should include sports
2. Need to establish mentors
3. Need to establish organized sports and accessible facilities for amputees
4. Need to integrate sport with work
5. Future studies examine role of depression, and funding issues



002

THE VALIDITY OF PATIENT AND PHYSICIAN ESTIMATES OF WALKING DISTANCE

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Objective: To establish the validity of patient and physician estimates of maximum walking distance versus actual measured maximum walking distance.

Design: Assessment of concurrent validity (patient and physician estimates were compared with a gold standard measure at the same time)

Setting: University-affiliated Rehabilitation department in a tertiary care hospital.

Subjects: A sequential sample of 31 patients over the age of 17 referred to the Physical Medicine and Rehabilitation outpatients department between May 1st, 2000 and July 20th, 2001 who had at least some degree of walking difficulty was approached to participate in the study.

Interventions: Patients and their physicians were asked to provide estimates of walking distance independently after a regular appointment prior to the patient being escorted along a pre-measured walking course.

Main Outcome Measures: The actual distance walked was compared to the patient and the physician estimates using Pearson correlation coefficients.

Results: Pearson correlation coefficients for patient estimate versus actual was 0.789 ($p < 0.0001$), and mean estimate of patient and physician estimates versus actual was .812 ($p < 0.0001$). Physician estimate versus actual and patient estimate versus physician estimate were 0.349 and -0.139 (neither was significant). Sixty-seven percent (20/30) of patients overestimated how far they thought they could walk versus 23% (7/30) of physicians who overestimated. Neither group was found to be “good” estimators of maximal walking distance.

Conclusions: Neither patients nor physicians provide valid estimates of maximal walking distance. Patients consistently over-estimate their maximal walking distance, whereas physicians tend to underestimate. Interestingly, patients’ estimates (although inflated) do correlate well with actual walking distance, while physician estimates are not at all correlated. This study suggests that reliance on self-reported or physician estimated maximum walking distances (whether for clinical, research or other reasons) is potentially flawed.

Key words: Walking; Distance; Validity; Rehabilitation; Self-report



003

ADVANCES ON THE PATHOGENESIS OF PROTEOGLYCAN LOSS IN JOINT CONTRACTURES

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Objective. To quantify histologically the loss of proteoglycan in articular cartilage, distinguishing between apposed and unapposed sites in joint contracture.

Methods. In this experimental controlled trial, 117 adult male rats underwent unilateral knee immobilization or sham-operation for periods of 2, 4, 8, 16 or 32 weeks. Eleven non-operated knees served as controls. On standardized sections, we identified femur and tibia cartilage sites that were apposed or that were unapposed. At both sites in the superficial and deep cartilage, we quantified the matrix staining intensity to toluidine blue with automated density measurements. We determined the effect of intervention (immobilized, sham and non-operated) on matrix staining, between apposed and unapposed sites, at each time point (2, 4, 8, 16 and 32 weeks) with ANOVA tests and post-hoc Bonferroni.

Results. Matrix staining decreased in immobilized knees only at unapposed sites. In the deep cartilage, immobilized knees stained significantly less than sham-operated knees 4, 16 and 32 weeks after knee immobilization (4 weeks: 150 ± 5 vs 117 ± 10 ; 16 weeks: 158 ± 10 vs 92 ± 9 and 32 weeks: 166 ± 8 vs 104 ± 4 ; all $p < 0.05$). In the superficial cartilage, the matrix of immobilized knees also stained significantly less than sham-operated and non-operated knees, 2, 4, 16 and 32 weeks after intervention (all $p < 0.05$). No significant change in matrix staining occurred at apposed sites neither in superficial nor in deep cartilage of the same immobilized knees.

Conclusion. Immobilization led to contrasting patterns of proteoglycan loss at apposed compared to unapposed sites. These results show that, in the absence of supraphysiologic compression, preservation of contact forces prevented proteoglycan loss from cartilage. These data suggest a distinct pathogenetic pathway for proteoglycan loss at unapposed sites, possibly through negative mechanotransduction.



004

THE VALUE OF US, MRI, AND DEXA IN ASSESSING THE EFFECT OF IMMOBILIZATION ON THE ACHILLES TENDON-BONE UNIT

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Objective. To find out whether Ultrasound (US), Magnetic Resonance Imaging (MRI) or Dual Energy X-ray Absorptiometer (DEXA) detect the effects of disuse caused by immobilization on the Achilles tendon-calcaneus unit.

Methods. Twelve adult rabbits had one hindlimb casted for 4 weeks and 10 rabbits were casted for 8 weeks. All 22 contralateral legs as well as 12 normal hindlimbs served as controls. Outcome measures were: cross-sectional area of the tendons assessed by US, T1/T2 signal abnormality in the tendon expressed as MRI optical density (T1OD/T2OD), and bone mineral density (BMD) of the calcaneus measured by DEXA.

Results. There was no statistical difference in the cross-sectional area ($8.9 \pm 2.5 \text{ mm}^2$ at 4 weeks, $6.3 \pm 1.6 \text{ mm}^2$ at 8 weeks vs. contralateral $6.7 \pm 2.3 \text{ mm}^2$, normal $7.1 \pm 2.4 \text{ mm}^2$), T1OD (85 ± 11 at 4 weeks, 89 ± 11 at 8 weeks vs. contralateral 93 ± 12 , normal 92 ± 7) and T2OD (118 ± 13 at 4 weeks, 117 ± 16 at 8 weeks vs. contralateral 116 ± 13 , normal 122 ± 16) of the Achilles tendons at all time point studied (all $p > .01$). By contrast, BMD of the immobilized calcaneus decreased by 4 weeks ($0.24 \pm 0.04 \text{ g/cm}^3$) and remained that level ($0.23 \pm 0.03 \text{ g/cm}^3$) at 8 weeks, statistically lower than the BMD of both contralateral ($0.37 \pm 0.03 \text{ g/cm}^3$) and normal calcaneus ($0.31 \pm 0.03 \text{ g/cm}^3$) (all $p < .01$).

Conclusion. We have previously reported a reduced mechanical stiffness of the Achilles tendon and histologic evidence of disuse osteoporosis after 4 and 8 weeks of cast immobilization. In this study neither US nor MRI detected any alteration of the Achilles tendon. We therefore believe MRI/US are not good predictors of mechanical alterations in immobilized Achilles tendon-calcaneus unit. DEXA, on the other hand, revealed decreased BMD in the immobilized calcaneus and correlated with altered mechanical/histological findings. Clinically, graded return to physical activity after lower leg immobilization may be better monitored by BMD at the bone attachment, rather than imaging the tendon itself.



005

RELATIONSHIP BETWEEN ABNORMAL CARDIOVASCULAR CONTROL AND SEVERITY OF ACUTE SPINAL CORD INJURY IN A MULTICENTER STUDY OF 760 PATIENTS

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There are only a few observations in small groups of subjects on changes in blood pressure (BP) and heart rate (HR) in the immediate period following spinal cord injury (SCI). We examined the relationship between the severity of SCI, evaluated with the American Spinal Injury Association (ASIA) score and cardiovascular parameters in the acute period of SCI in patients admitted to the Sygen multicenter study. Cardiovascular parameters were collected at three different time points of patients management: First emergency room (presented in Table), SCI acute care facility, and at the time of randomization. On average the mean time lapsed since the injury to the last measurements was 6.2 ± 10.6 hours. Total of 760 patients from 28 centers in North America were included into the study. The majority of included patients were male (80.1%, M609/F151). The median age of subjects was 30 years. Most individuals sustained cervical SCI.

Initially, marked hypotension (109 ± 22 mmHg) and bradycardia (73 ± 17 bpm) were observed in individuals with severe cervical SCI (ASIA A and B, $P \geq 0.03$). Hemodynamic parameters in individuals with thoracic SCI were within the normal range ($P \geq 0.4$). Baseline SBP and DBP, but not HR taken at the time of randomization were improved significantly from the values recorded in the initial stages of SCI. For example, in individuals with complete cervical SCI the mean SBP, measured in first emergency room increased significantly by 11% by the time of randomization. Lower HR in all individuals with cervical SCI was persisted to the time of randomization. However, the hemodynamic parameters of individuals with the thoracic SCI did not show any changes.

Marked hypotension with bradycardia was a predominant feature of the severe cervical SCI. Although with time after SCI, amelioration of the BP was observed in these individuals, and bradycardia persisted to the time of randomization. Loss of sympathetic drive to the heart (T1-T4) and predominant vagal control probably is a cause for this persistent low HR.

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006

DOES ANESTHESIA AFFECT STUMP AND PHANTOM LIMB PAIN?

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We have initiated a prospective study of stump and phantom limb pain after lower limb amputation. In the first phase of the study, we assessed patients after lower limb amputation to determine if there is any correlation between choice of anesthesia and subsequent stump and phantom limb sensations. The University of Manitoba Human Ethics Committee approved the study. Patients who consented to take part in the study, were interviewed and assessed with standardized questionnaire and pain scale, about stump pain, phantom limb sensation and phantom limb pain. The amount of pain was rated on a scale starting at 0 (no pain) to 10 (worst pain imagined). Fifty-four patients completed the assessments. The average time from surgery to interview was 13 months. Twenty-nine (53.7%) had spinal anesthesia (s), 15 (27.8%) had general anesthesia (g) and 10 (18.5%) had epidural anesthesia (e). The epidural (e) patients had epidural anesthesia during surgery and a continuous infusion of 0.125% bupivacaine and 15mcg/mL hydromorphone for postoperative pain relief for 24 to 48 hours. There was no significant difference in the average age, sex distribution and type of amputation between the three groups. Phantom sensations were reported by 74% (s), 87% (g) and 89% (e). Stump pain were reported by 31%(s), 40%(g), and 40%(e). The average severities were 6(s), 6.3(g) and 6(e). Phantom limb pain were reported by 59%(s), 60%(g) and 70%(e). The average severities were 6.5(s), 7(g) and 5.5(e). The choice of anesthesia does not affect the incidences of stump and phantom limb pain at 13 months after surgery.



007

**MEDICAL NEEDS OF SPINAL CORD INJURED PATIENTS IN THE COMMUNITY?
A MAILED SURVEY**

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Objectives: To assess whether the medical needs of the spinal cord injured population are being met in the community and to evaluate what the most common outpatient medical issues are.

Methods: Questionnaires were mailed to spinal cord injured people registered with the Canadian Paraplegic Association, Alberta chapter. The questionnaire focused on personal information, medical issues and questions regarding satisfaction with medical care.

Results: 75 surveys (40% response rate) were analyzed after the first wave of mailing. A further mail out and phone follow-up is planned to increase the response rate. 76% of the respondents were male, 60% lived in rural Alberta, and most sustained their spinal cord injury five to ten years ago. 45% were quadriplegics and 44% had complete spinal cord injuries.

The most common medical issues encountered in the community were urinary tract infections (85%), bowel care difficulties (78%), bladder care and catheter troubles (70%), spasticity (68%), and shoulder pain (62%). Approximately 35% of patients had questions regarding their medications.

77% of patients were satisfied with their inpatient rehabilitation, whereas only 60% were satisfied with physician follow-up after discharge from hospital. 41% of people feel that their medical care has suffered since being at home.

Conclusions: The results of the survey have identified important outpatient medical issues that spinal cord injured patients suffer from. Unacceptably, a large proportion of individuals appear to be dissatisfied with the medical care they receive in the community. The reasons for this need to be investigated further in order to find solutions to improve medical care.



008

CASE SERIES OF NEUROPATHIC FACIAL PAIN IMPROVED WITH BOTULINUM TOXIN-A

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Case one: A 63-year-old woman with chronic right-sided trigeminal neuralgia. Neurosurgical decompression 18 years ago provided 5 years relief. Treatments included injections 13/12 years ago (complicated by meningitis), phenytoin, carbamazepine. Despite gabapentin 2400 mg/ day, she complained of severe burning in the cheek and “screw-like” pain in the palate. Physical examination revealed cutaneous allodynia in right V2/V3 distribution. Facial EMG with blink reflexes were normal. Intradermal 1%lidocaine provided 6 hours of relief. 60 units (1:1 dilution) of Botulinum Toxin-A (BTX-A) were then injected intradermally in sites spaced 1 cm apart.

<u>Outcome measure</u>	<u>Pre-injection:</u>	<u>6 weeks-post-injection:</u>
Visual analogue scale pain (VAS)	7/10	1/10
Neuropathy Pain scale (NPS)	65/100	16/100

For the first time in years, she was able without pain to: brush teeth, chew food, ride in jeep with window down. After another 100 units, she had temporary right facial weakness, but by 4 months, she had weaned off gabapentin with pain reduced by 85%.

Case two: Another 63-year-old female developed a left-sided painful blistering shingles rash over the V1/V2 distribution. She was treated with oral acyclovir but continued with burning, stabbing pains over the eye, temple and scalp. Treatments included morphine, demerol, amitriptyline, prednisone, carbamazepine and gabapentin 3300mg/day limited by fatigue. Cutaneous allodynia was over the left V1/V2. Intradermal 0.25%marcaine provided 12-18 hours of relief. 50 units of intradermal BTX-A was injected in a follow-the-pain approach.

	<u>Pre-injection:</u>	<u>4 weeks-post-injection:</u>
VAS	10/10	2/10
NPS	84/100	19/100

Despite a temporary left ptosis, her pain diminished by 80-90%. She discontinued her opioids and decreased her gabapentin dosage by half. Two further 50-unit injections provided continued pain control.

Conclusion: BTX-A intradermal injections appear helpful in alleviating the pain of post-herpetic facial neuralgia and trigeminal neuralgia.

(With podium presentation, videotaped demonstration of injection techniques will also be done).



009

IMPROPER TRANS-TIBIAL PROSTHESIS SILICONE LINER USE: A CASE OF SKIN BREAKDOWN

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Objective: We describe a case of skin breakdown caused by the improper use of a silicone prosthetic liner on the residual limb of an 80-year-old man with a recent trans-tibial amputation for peripheral vascular disease.

Case Report: This patient had a number of co-morbidities, including stroke-related cognitive impairment, type 2 diabetes mellitus, coronary artery disease with previous myocardial infarction, anemia of chronic disease, post-herpetic neuralgia, and pruritus of uncertain origin. When not using his prosthesis, he found the 1.5mm-thick silicone liner (ICEROSS) more comfortable to wear than the combination of stump shrinker and thermoplastic protector. In order to have access to pruritic skin when he was not wearing his prosthesis, he chose to repeatedly wear his liner rolled halfway down his residual limb. This led to the formation of a horizontal, linear, Grade-2, pressure ulcer, worse on the lateral aspect of the limb, under the upper edge of the rolled liner.

Conclusion: This previously unreported finding has implications for people with amputations who are fitted with silicone liners and pin-suspension systems, including: the importance of patient selection for such systems, proper training of all concerned (patients, families, nurses, and therapists), and proper management of patient co-morbidities.



010

LONG TERM FOLLOW UP OF PATIENTS TREATED WITH PROLOTHERAPY FOR LOW BACK PAIN

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The paper reviews the first 100 patients with low back pain treated with prolotherapy and followed up with pain and quality of life analogue scales one (1) year after the last treatment.

The patients that had clinical evidence of ligamentous low back pain were offered a trial injection of 1% xylocaine without epinephrine into the affected ligamentous sites. If the trial injection resolved or markedly decreased the pain for 10 minutes to 4 hours the patients were offered a course of prolotherapy. The patients were then informed of the risks of treatment and asked to sign a consent form.

Patients received treatments approximately every two weeks. At each visit the tender ligament sites were identified and injected as per a Hackett/Hemwall protocol with a solution of 2.5% phenol, 25% dextrose, and 25% glycerin mixed 50-50 with 1% Xylocaine without epinephrine. If they had not improved after 6 treatments the injections were stopped. Treatments continued if the patients were improving until they became pain free or plateaued in their recovery.

There were 14 males and 30 females who completed the course of treatment and were followed up one year after the last treatment. The mean age was 47.4 years for males and 47.1 for females. Five males and 6 females had insurance involvement. The duration of pain prior to treatment ranged from 4 to 312 months for the males (mean 76.6), and 7 to 300 months for the females (mean 60.1). The mean pain level before treatment was 6.2 and at 1 year it was 3.1 ($p < 0.001$). The mean quality of life scale before treatment was 7 and at 1 year was 2.9 ($p < 0.001$).

Prolotherapy can be a useful treatment modality in some patients with low back pain with positive results lasting at least one year after treatment.



011

WHEELCHAIR WHEELIES: USING POTENTIOMETERS TO MEASURE THE REAR-WHEEL DISPLACEMENT AND PITCH ANGLE

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Objective: The objective of this study was to develop a system to quantify the rear-wheel displacement and pitch angle during wheelie performance on a variety of terrains.

Method: Initially we tried a force platform (Kistler), a wheelchair-mounted accelerometer (MadgeTech) and kinematic software (HU-M-AN) for digitizing videotaped images. Although each of these approaches met with some success, each had disadvantages. Finally, we adapted a system that Kozey et al (Ergonomics, 1994;36:1031-46) had reported to quantify reach envelopes. Our adapted system consisted of two spring-loaded potentiometers (manufactured by Bourns, Model 3540S-1-103, 10 turns, 10K ohms, with 0.25% linearity) attached by kite strings to the wheelchair between the rear-wheel axles and between the push handles. The potentiometers were mounted on an adjustable-height platform. A signal-conditioner/amplifier, which produces +10V DC full range and has a 15Hz analog low-pass filter, was connected to the potentiometers. Signals were digitized by an A/D convertor (AT-MIO-16) and Lab-windows software (50Hz) and stored on a personal computer in Excel. Voltages were converted to centimeters by a calibration procedure. The Law of Cosines was used to calculate the pitch angle.

Results: In our experience to date, recording wheelie data from 10 wheelchair users and 10 able-bodied participants, the system generally functioned well. The only difficulties experienced were the variations in attachment points among different wheelchairs, an occasional spring malfunction and some resonance in the kite lines during sudden movements.

Conclusion: The two-potentiometer system is a simple, inexpensive and practical method of measuring rear-wheel displacement and pitch angle during wheelie performance. Although some difficulties were identified, with care, high quality data can be collected. Data derived from this system may help to better understand the strategies used to perform wheelies and improve methods of teaching them.



012

COMPARISON OF DIDACTIC VERSUS CASE BASED REHABILITATION TEACHING OF MEDICAL STUDENTS: A PILOT STUDY.

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Objective: To determine whether case based teaching of rehabilitation topics to medical students results in better exit survey results and test scores compared to those taught by standard lecture based didactic teaching.

Methods: A group of third year medical students (n=46) enrolled in an undergraduate class in Physical Medicine and Rehabilitation (PM&R), were divided into two groups. One group (n=31) was taught using classical lecture style instruction while the other (n=15) learned in small groups using case based methods. On completion of the course, students were asked to complete a nine item questionnaire. Several questions asked the students to rate each item using an ordinal scale of poor, fair, good, excellent. Some questions prompted students to make personal comments about the course. A final mark comprised of clinical performance and results of a multiple choice exam was also given at the end of the course.

Results: Significant differences were found in four of the seven categories between the medical students taught in small groups compared to lectures. Improvements were seen in: course content (p<.001), materials provided (p<.001), amount of material for the course (adequate vs. too much/too little) (p=.001), and perception of quality of instructor (p=.005). Subjective pre-course vs. post-course understanding of PM&R did not differ (p=.08). No difference was found in test scores between the two groups (p=.72) or whether they would consider a residency in PM&R (p=.52).

Conclusion: Third year medical students learning PM&R for the first time, perceived greater benefits in case-based teaching when compared to a more traditional didactic approach. However, no improvement was seen in their test scores or in whether they would consider a residency in PM&R.



014

EVALUATION OF AUTOMATED BLOOD PRESSURE MEASUREMENTS DURING CARDIOPULMONARY EXERCISE STRESS TESTING: ARE THEY ACCURATE?

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Objective: To prospectively compare blood pressure (BP) values obtained by automated, audible, and manual (accepted mercury standard) methods in cardiac rehabilitation patients undergoing cycle ergometer exercise stress testing, and to determine which method of BP measurement is most accurate during exercise stress testing.

Methods: Systolic and diastolic BP values of cardiac rehabilitation outpatients undergoing cycle ergometer exercise stress testing were collected from 46 subjects. BP values were collected from both arms simultaneously at rest, every 2 minutes during test, and 1 minute and 4 minutes post-exercise with manual, automated, and audible BP measurement devices.

Results: The differences between BP values obtained by the manual and automated methods were statistically significant. The differences between BP values obtained by the manual and audible methods were not statistically significant.

Conclusions: The use of the manual method (accepted mercury standard) for multiple BP readings during a cardiopulmonary exercise stress test is technically impractical. Given that the differences in BP values obtained by the manual and audible methods were not statistically significant, the audible method of collecting BP readings can be used as a reasonable surrogate for the manual method. This is true regardless of inter-arm BP differences. Thus, BP measurements during cardiopulmonary exercise stress testing should be collected by the audible method to ensure that critical decisions regarding timely cessation of the test and the creation of the exercise prescription are based upon accurate BP values.



016

THE REHABILITATION OUTCOMES OF STROKE PATIENTS RECEIVING RECOMBINANT TISSUE PLASMINOGEN ACTIVATOR (rt-PA)

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Objective: Recombinant tissue plasminogen activator (rt-PA) is a relatively new treatment for stroke, which has the potential to reverse the symptoms of stroke, eliminating or reducing the need for continued hospitalization. However, not all patients benefit from the treatment and many still require rehabilitation. The outcomes of patients who received rt-PA acutely and who were subsequently transferred to a rehabilitation unit (n=14) were compared to patients with either a left or right hemispheric stroke who were also transferred from the acute neurology service, but who did not receive rt-PA (n=109).

Methods: Data were obtained through chart review.

Results: From Jan 1, to Dec 31, 2002, 65 patients received rt-PA within five hours of onset of symptoms, at a university affiliated tertiary care facility, located in London, Ontario. The average time from onset of symptoms to rt-PA administration was 2:27 hours (range 1:45-4:25 hrs) and the average total dose of rt-PA was 69.6 mg IV, administered over one hour (Range 38.9-90 mg). There were no statistically significant differences in functional outcomes, measured by the FIM instrument, although there were trends favouring patients who received rt-PA. These patients had higher mean admission and discharge FIM scores (74 ± 23 vs. 67 ± 24 ; $p=0.294$ and 98 ± 25 vs. 88 ± 28 ; $p=0.199$), and faster mean rates of recovery, defined as FIM efficiency ($0.60 \pm .38$ vs. $0.49 \pm .37$ total FIM change/length of stay; $p=0.308$). There was also a non-significant trend suggesting that patients who received rt-PA arrived sooner on the rehabilitation unit (mean 20 ± 11 vs. 28 ± 27 days; $p=0.256$) and had shorter lengths of stays (mean 45 ± 17 vs. 53 ± 29 days; $p=0.155$).

Conclusions: The rehabilitation outcomes of patients receiving rt-PA acutely were similar to those of patients who did not receive the treatment, although there may have been insufficient power to detect statistically significant differences between the groups.



017

COMPARISON OF LONG TERM OUTCOMES OF NON-TRAUMATIC WITH TRAUMATIC BRAIN INJURED PATIENTS

Yoon-Ghil Park, Nora Cullen

Objectives: To compare outcomes at rehabilitation discharge and one year post event between patients with traumatic brain injury (TBI) and those with non-traumatic brain injury (NTBI).

Methods: Demographic data, treatment interventions and established outcome measurements were collected on patients with moderate to severe TBI and NTBI who were admitted to an inpatient rehabilitation facility. These data were entered into a database for comparison at admission, discharge and at one year follow up.

Results: Of 293 subjects, 220(75%) were TBI and 73(25%) were NTBI with males being 74% and 73% respectively. The mean age of the groups was 43.9±17.7y (TBI) vs. 51.4±14.4y (NTBI). There were no significant differences of marital status and education level. The percentage of individuals who were employed pre injury and unemployed at one year post injury were 28% for TBI vs 33% for NTBI group (non significant).

Length of time between the initial brain insult and rehab admission for TBI patients compared with NTBI patients was 54.4±47.2 days and 97.4±76.1 days respectively. There were no significant differences in the length of rehabilitation stay (69.1±64.6 days for and 64.9±32.0 days for NTBI).

There were no significant differences in outcomes in DRS (Disability Rating Scale) between the two groups at admission. However, the TBI group had higher scores in FIM (Functional Independence Measure) than those of NTBI group at admission. At discharge and one-year post injury, patients of TBI group had better functional outcomes in both DRS and FIM.

Comparison of Outcomes

	TBI (N)	NTBI (n)	Sig
DRS			
admission	6.0 (220)	6.0 (73)	0.79
discharge	3.0 (166)	7.0 (47)	0.00
one-year follow-up	1.0 (84)	5.0 (13)	0.03
FIM			
admission	92.5 (96)	71.5 (42)	0.03
discharge	118.5 (62)	109.0 (24)	0.00
one-year follow-up	123.0 (34)	115.0 (7)	0.00

Values are median

Conclusions: This study that the one-year recovery of persons with NTBI is significantly less than that of patients with TBI. Further research is needed to find effective interventions to address these differences.



018

A COMPARISON OF THE BARTHEL INDEX AND FUNCTIONAL INDEPENDENCE MEASURE AS OUTCOME MEASURES IN STROKE REHABILITATION: PATTERNS OF DISABILITY SCALE USAGE IN CLINICAL TRIALS

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Objective: To compare the frequency, and trends of use of the Barthel Index (BI) and Functional Independence Measure (FIM) in stroke rehabilitation trials and the quality of studies in which they are used.

Methods: All identified randomized controlled trials (RCTs) involving current practices in stroke rehabilitation published between 1968-2002 were reviewed to determine and compare the frequency, date, and location of use of the BI and FIM as outcome measures, as well as the quality of the trials (measured using the PEDro scoring system) in which they appeared.

Results: The BI and FIM were the two most commonly used scales of disability. The BI was used more frequently than the FIM ($P < 0.001$). However, studies from North America were much more likely to use the FIM compared to European studies ($P < 0.001$). The age of publications citing the BI were older in North America than those from Europe ($P = 0.023$). The quality of trials using the BI were considerably better than those using the FIM ($P = 0.005$).

Conclusion: The BI and FIM were the most common measures of disability used in stroke rehabilitation RCTs. However, the BI was used much more often than the FIM and was also cited in trials of superior quality. Nonetheless, an existing, and perhaps growing, preference for the FIM has developed in North America relative to the rest of the world. These results may provide information on the current patterns of functional outcome measures used in stroke rehabilitation research.

Key Words: Barthel Index • Functional Independence Measure • Outcomes • Stroke Rehabilitation

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019

AGING WITH A SPINAL CORD INJURY: FACTORS ASSOCIATED WITH THE NEED FOR MORE HELP

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Objectives: The objectives of this study were to determine (1) the prevalence of a decline in function as expressed by the need for more help (NMH), (2) the prevalence of medical problems, and (3) the association between medical, injury and socio-demographic factors and the NMH, among people aging with spinal cord injury (SCI).

Methods: The study was a cross-sectional secondary analysis of a dataset (n=352) obtained by surveying individuals with SCI in Canada, the U.S. and England. Participants had acquired an SCI at least 20 years previously. To determine the NMH outcome, participants were asked whether or not they needed more help with activities of daily living (ADL) over the past three years. Medical, injury and socio-demographic data were also obtained from the dataset. Multivariate logistic regression was used to determine the relationship between the NMH and the medical, injury and socio-demographic variables.

Results: 32% needed more help to perform ADLs within the past three years. Those needing more help were significantly older (59.3 ± 10.7 vs. 56.3 ± 10.1 years, $p < 0.05$) and had lived longer with SCI (35.3 ± 8.1 vs. 32.5 ± 8.1 years, $p < 0.05$). Level and completeness of SCI were not related to the NMH ($p > 0.05$).

The most prevalent medical problems were constipation (48%), bowel accidents (42%) and pressure sores (39%).

On multivariate analysis, constipation (OR=1.97, 95% C.I.=1.19-3.26), pressure sores (OR=1.76, 95% C.I.=1.07-2.87), female gender (OR=1.96, 95% C.I.=1.04-3.70) and decades post injury (OR=1.42, 95% C.I.=1.00-2.01) were significantly associated with an increased likelihood of needing more help over a three year time period.

Conclusions: This study may be used to identify those individuals most at risk for a decline in function. Aggressive prevention and management of neurogenic bowel and pressure sores has the potential to maintain the independence of people 20 years post-SCI.



020

CASE SERIES OF FIBROMYALGIA PATIENTS IMPROVED WITH ORAL CANNABINOIDS

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Dr. Annie Hum MD CAFCI

Dr. Vincent Maida MD

Michael Jokic Yr 3 student (University of Toronto)

Introduction: This is the first reported case series of cannabinoid use in fibromyalgia.

Case #1: A 50-year-old public health nurse, divorced mother-of-2, presented with longstanding “fibromyalgia”. This included neck pain x 26 years, low back pain x 23 years, migraines x 13 years. Predisposing childhood factors included: growing pains, eating disorder, depression (father died of Hodgkin’s). Associated syndromes: costochondritis, plantar fasciitis, tendonitis, menopause. Non-helpful treatments included mobicox, amitriptyline, glucosamine, fish oil, guaifenesin (naturopathy), massage, pool exercise, cognitive-behavioral and relaxation therapy. Temporary relief with toradol, robaxacet, acetaminophen, topical rubs, heating pad, chiropractic, osteopathy. She was allergic to meperidine and codeine. Cold made her worse. She declined acupuncture or injections. For migraines, she used migranal, zomig, fiorinal. L-tryptophan helped with sleep only. She never tried marijuana. Physical exam: BMI 38 (5’7” 240lbs.), BP 120/80. 18/18 tender points. Positive tinell’s with no neurologic deficit nor signs of connective tissue disease. Bone scan: degenerative changes: shoulders, ankles, feet, T10-12,L3-L5 facets. Ultrasound suggested borderline right CTS but EMG study was normal. Negative TOS doppler study. Beck depression score: 9/63. She was started on nabilone 1mg QHS. Her pain and stiffness were reduced. Side-effects included dizziness x 2 days, dry mouth x 1 week. After two weeks, the dose was increased to 1 mg BID. By 1 month, pain and headaches were further decreased.

	Pre-treatment:	Two months later:
VAS pain (best to worse):	5-8/ 10	4-5/10
Fibromyalgia Impact Questionnaire	24.3	19.3
Tender point count	18/18	16/18
Average tender point pain threshold	2.18kg	2.6kg

Other cases will be presented in detail suggesting that:

Responders have low depression ratings, no previous adverse reaction to cannabinoids, and are employed. Poor responders include those with unstable psychiatric states, multiple environmental sensitivities, nondermatomal somatosensory deficits, on (or seeking) disability claims.

Conclusion: Nabilone appears helpful as an adjuvant pain medication for carefully pre-screened fibromyalgia patients.



021

NON MALIGNANT, CHRONIC PAIN EDUCATION IN PHYSIATRY RESIDENCIES ACROSS CANADA

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The purpose of this study is to 1) explore the intensity and perceived importance of chronic pain education across Physiatry residencies in Canada and 2) assess the benefits of an educational intervention program designed to improve the knowledge, attitudes, beliefs and skills of Physiatry residents in the area of chronic pain management.

This study is comprised of three phases.

Phase one entailed distribution of questionnaires to residents and the Program Directors of the ten Physiatry Residency Programs across Canada to determine the baseline beliefs and attitudes of Canadian Physiatry residents in the area of chronic pain management.

Phase two included a pilot educational intervention for the physiatry residents of the University of Toronto. Pre and posttest evaluation, as well as satisfaction surveys, were employed to evaluate educational effectiveness. Later, a six-month post intervention test will be given to determine the long-term retention of knowledge and potential changes in attitudes and beliefs of residents. As well, a subset of participants will keep logbooks related to patients seen with chronic pain. Interviews with these participants will attempt to document any impact the educational intervention may have had on their clinical practice of chronic pain assessment and management.

Phase three will involve utilizing the results of phase one and two to develop a final educational intervention that will be part of the National Canadian review course for Physiatry residents in March, 2004. Again, a pre and post questionnaire will help determine the efficacy of the intervention.

Results are currently being obtained and analysed. It is anticipated that they will show a need for further education in the area of chronic pain as well as demonstrate an intervention that fulfills that need.



022

DRIVING TEST SUCCESS IN STROKE PATIENTS COMPARED TO OTHER DISABLED GROUPS

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Objectives: The objective of this research is to determine the driving success rate of stroke patients participating in formal driving assessment compared to other disabled groups.

Methods: This is a retrospective cohort study design. A total of 700 patients with stroke and other diagnoses were referred to The Rehabilitation Centre (TRC) between 1995 and 2003 to be assessed by an in-house physiatrist affiliated with the TRC Driving Assessment Program. Patient sources included former inpatients from TRC and Élisabeth Bruyère Health Centre, and outpatients in the community with a noted disability. Data collected and analyzed (SPSS) included results from visual and perceptual testing (Bells Test, Charrons Test, Light Board Scanner Test, Cross-checking Test, Trailmaking A & B Test), a Drivers Reaction Time Test, and an On-Road Driving Test. A pass or fail result was provided to each patient and the Ministry of Transportation.

Results: Participants were divided into two groups for the purposes of analysis; stroke patients versus nonstroke patients. The patient population consisted of 230 stroke patients, 95 patients with traumatic brain injury, 66 patients with amputations, 44 patients with Multiple Sclerosis, 60 patients with spinal cord injury, 69 patients with neuromuscular disorders, and 136 classified as “other”. The average age for stroke patients was 62 years compared with 52 years for nonstroke patients. Patients in the stroke group consisted of 78% male and 22% female group versus 71% and 29% in the nonstroke group.

Preliminary statistical analysis indicates that 39% of stroke patients passed their formal driving assessment compared to 56% of all other disabled groups combined (p -value = 0.0001). After adjustment for age and sex covariates, the pass rate differences remained statistically significant ($p=0.01$).

Conclusion: A unique, large driver's database focusing on the disabled driver has been described. Stroke patients' success rates on formal driving assessment are statistically and clinically significantly different compared to other disabled groups. Visual-perceptual and other performance differences will be accounted for in future data analysis.



023

EXERCISE INDUCED AMELIORATION OF FOCAL DYSTONIA

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Given the potential cost and side effects of management of focal dystonia in musicians, an alternative approach was envisioned which would allow for determination of the possible therapeutic effect of intentionally produced muscle fatigue. Flexor digitorum profundus and superficialis are the most common muscles implicated in focal dystonia in bagpipers. A 70 year old piper presented with a 20 year history of focal dystonia after an extremely successful career as a professional piper in the military. The impaired ability to lift the index and long finger of the left hand, disabled musical performance to the extent that even the scale could not be played. Given the significant co-contraction that was observed in the finger flexors it was hypothesized that a temporarily beneficial effect could be obtained by titrating fatigue of the offending muscle group against musical performance. Fatigue was produced by repeated resisted flexion of the index and long fingers of the left hand. The initial response was a decrease in co-contraction of forearm antagonist muscles during playing. At first the response was temporary as expected. Later, there was an exercise-induced effect such that more repetitions were required to produce the desired therapeutic fatigue. There has been a sustained therapeutic response which was unexpected and has resulted in the ability to play for several hours without re-occurrence of the dystonia.



024

USE OF A TOPICAL NON-STERIODAL ANTI-INFLAMMATORY PREPARATION IN THE MANAGEMENT OF REFRACTORY ANTERIOR TIBIAL PAIN

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Given that anterior tibial pain can often be significantly refractive to management, an alternative approach was explored in a gentleman affected by the sequelae of trisomy 21 who encountered persistent, severe anterior tibial pain consistent with periosteal reaction to anterior tibial tendonitis. Barriers to successful treatment often include intolerance of oral non-steroidal anti-inflammatories (NSAID), difficulties with compliance with appropriate exercises, lack of response to modality interventions (e.g., ultrasound) and significantly altered lower extremity biomechanics resulting in excessive mechanical stress when walking (Charlie Chaplin Gait). Local injection of steroid was not a consideration. A topical NSAID in solution form was provided to this gentleman to determine if this resulted in even temporary relief. The result has been a significant reduction in pain, although intermittently gastric upset still occurs. A therapeutic result has been sustained, preceded by months of significant pain refractory to other management. Recognizing that transdermal absorption has, over recent times, been demonstrated to be an effective means of administering systemic preparation such as nicotine, estrogen, progesterons and narcotic analgesia, re-exploring the newer vehicles, which facilitate transdermal absorption of medication to produce a local affect, should be re-considered as a possible therapeutic approach in the management of musculoskeletal pain.



025

FREQUENCY OF REPORTED COMPLICATIONS FOLLOWING SPINAL CORD INJURY

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The frequency and impact of complications following spinal cord injury (SCI) was determined as part of an investigation of the role of rehabilitation in reducing secondary complications. A survey of 919 consumers with traumatic SCI yielded 207 respondents (22.5%), with the most frequently reported complications being those associated with the direct neurological consequences of the injury (pain, spasms, bowel or bladder incontinence and sexual dysfunction). Those secondary complications not a direct consequence of untreatable neurologic impairment, and therefore potentially preventable, included fatigue (59.0%), upper extremity pain (58.5%), obesity (39.0%), hemorrhoids (38.5%) and urinary tract infections (30.0%). We assessed the overall impact of these complications by using the product of prevalence and severity (i.e., respondents ranked severity on a 5 point scale). Pressure sores received the highest ranking. Complications considered to occur typically later (upper extremity pain>symptomatic osteoporosis>fractures>renal stones), were ranked moderate to low - a consequence of their lower prevalence. When asked to assess the general impact of secondary complications on their daily life, most respondents indicated either a moderate (37.8%), severe (29.0%) or very severe (13.5%) impact. Only 2.1% reported no impact, indicating the importance of better addressing the concept of preventability.



026

UTILIZATION OF INFORMATION BY CONSUMERS IN THE PREVENTION OF SECONDARY SEQUELAE OF SPINAL CORD INJURY

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In order to optimize the use of educational approaches in potentially decreasing the incidence of secondary complications following spinal cord injury (SCI), a consumer survey (n=207) was used to obtain an indication of what information sources were accessed versus preferred by persons with SCI. When considering only those respondents using a particular information source, the proportion of respondents indicating a source as their preferred information source was as follows; Physician specialist (25.9%), internet (22.9%), general practitioner (22.8%), other health care providers (18.6%), peers (16.2%), magazines, journals or newsletters (11.7%), television or video tapes (3.5%) and books (1.7%). Overall, people sources were ranked higher than media sources. The internet was ranked highest for speed of information access and accessibility while physician specialists were deemed as providing the most accurate, specific and current information. Given the diminishing resources in today's healthcare system, alternative methods of provision of patient education should take into account enhancing the quality and reliability of mediums such as the internet to improve cost efficiency and access.



027

PERCEIVED IMPORTANCE AND AVAILABILITY OF FACTORS AFFECTING THE HEALTH OF SPINAL CORD INJURED PERSONS

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This study was designed to capture the collective consumer experience to determine the potential to reduce long term secondary complications. In a survey of spinal cord injured (SCI) persons (n = 207/919), the perceived importance and availability of factors affecting the health of SCI persons was rated as never important/available (-2) to always important/available (+2). Mean values for each factor were positive. Discrepancies were evident between importance and availability, with importance deemed greater than availability, indicating that perceived needs were not being met. The greatest disparity was noted for funding for equipment, followed by funding for medication and access to transportation. Access to information was also a need indicated to be only partially met. Social contact, access to medical services and personal support needs appeared to be more closely met. From regression analysis, perceived unfulfilled needs of social contact and personal support appeared to be the best predictors for having a higher number of complications. Reducing secondary complications therefore requires a multifactorial approach.



028

CANNABINOID INHIBITION OF AXONAL INJURY INDUCED BY PEROXYNITRITE

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The **objective** of this study was to exam whether cannabinoid could protect, by its direct action, peroxynitrite-induced axonal injury in rats. ‘

Methods: Rats received bilateral adrenalectomy and then injection of the peroxynitrite donor 3-morpholinosydnonimine into the corpus callosum to induce axonal injury. Rats were given a corticosterone replacement treatment that mimicked the circadian rhythm of circulating adrenal steroids. Immediately after surgery, 7 groups of rats received twice daily intraperitoneal injections, for 4.5 days, of the CB1 receptor agonist HU210 (25, 50, 100 µg/kg), the CB1 receptor antagonist AM281 (0.1, 1, 3 mg/kg), and vehicle. Rats were sacrificed 5 days after surgery by perfusion through the heart with 4% paraformaldehyde, followed by cutting rat brains into sections on a sliding microtome. The sections were stained with immunohistochemistry with antibody against amyloid precursor proteins (APP), based on the previous finding that degenerating axons in the corpus callosum would show immunostaining of APP. Quantification was performed by counting the numbers of APP-immunoreactive nerve fibres.

Results: Vehicle injected rats showed prominent axonal injury (i.e. APP-immunoreactive axons), which is similar to the previous findings [Touil et al., 2001]. The rats treated with the CB1 receptor agonist HU210 exhibited a dramatic reduction of axonal injury in a dose-dependent manner, whereas the CB1 receptor antagonist AM281 treated rats displayed an enhancement of axonal injury in a dose-dependent manner.

In **conclusion**, our results suggest that cannabinoid is able to inhibit peroxynitrite-induced axonal injury in rats by its direct action but not by its indirect action of promoting corticosterone secretion.



029

ACUTE EXERTIONAL COMPARTMENT SYNDROME IN THE SETTING OF ANABOLIC STEROIDS: AN UNUSUAL CAUSE OF BILATERAL FOOTDROP

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Background: Footdrop is a common clinical problem encountered by electrodiagnosticians. This case illustrates an unusual location and cause for bilateral foot drop—acute exertional compartment syndrome of the pretibial compartment.

Case report: A 22 year-old male boxer presented to the emergency department following an assault in which he was stabbed in the heart. He required urgent cardiac surgery. Four days post-op, he complained of shin pain despite adequate analgesia for his sternal wound. He had tender, swollen anterolateral leg compartments and had severe (MRC 1/5) weakness of tibialis anterior bilaterally.

Further history revealed that he had been taking anabolic steroids for 1 month prior to hospital admission. Over this time, he had had three transient episodes of shin pain, foot drop and numbness after running for a few minutes. These symptoms had resolved with rest.

Nerve conduction studies were consistent with bilateral deep and superficial peroneal neuropathies. There was no conduction block across the fibular heads. EMG of the tibialis anterior muscles bilaterally showed no spontaneous activity and no recordable motor unit potentials. EMG of the peroneus longus, gastrocnemius and short head of biceps femoris muscles were normal bilaterally. Repeat EMG three weeks post admission was unchanged. MRI of the lower legs revealed extensive hemorrhagic necrosis of the tibialis anterior muscles bilaterally.

Discussion: Acute exertional compartment syndrome may occur in the setting of rapid muscle hypertrophy due to anabolic steroids. It results in ischemic necrosis of the pretibial compartment muscles and may present as footdrop. MRI may be used to differentiate peroneal neuropathy from compartment syndrome. This distinction is of importance as acute exertional compartment syndrome is a surgical emergency.

Conclusion: Compartment syndromes should be considered in the differential diagnosis of footdrop particularly in the setting of anabolic steroid use. MRI imaging may provide unique diagnostic information that complements the electrodiagnostic evaluation.



030

SURFACE EMG CHANGES WITH BOTULINUM TOXIN-A INJECTIONS FOR FAILED SURGICAL PAIN SYNDROMES

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 Mr. Pablo Diatel BSc(Kin) (Global Managed Healthcare)

Introduction: A novel approach to monitor response to BTX-A injections.

Case #1: A 53-year-old woman developed post-traumatic headache after a MVA in 1989. CT/MRI scans were normal. Over the subsequent 10 years, she had 12 surgical procedures including open C2 ganglionectomy, cervical facet rhizolyses x3, C2 neurotomy, right temporal artery and bilateral supraorbital nerve excisions and percutaneous microballoon compression of gasserian ganglion. Despite palliative nerve blocks from the referring anesthesiologist, she still complained of daily bifrontal headaches, neck and upper shoulder pain. Medications included Topamax, Paxil, Oxycontin, Stemetil, Amitriptyline, Ibuprofen, Losec. Physical examination revealed hypoesthesia in the forehead and C2 distribution. Tenderness was most marked in the upper trapezii, frontalis and paracervical muscles. BTX-A injections administered to the pericranial and trapezii muscles showed good response.

<u>Outcome measure</u>	<u>Pre-injection:</u>		<u>One month Post-3rd injection:</u>	
Visual analogue scale (VAS) pain	7/10		4/10	
Headache Disability index	92/100		84/100	
Vernon-MiorQ.	33/50		28/50	
Surface EMG RMS amplitudes(uV):	left	right	left	right
Frontalis -sitting at rest:	2.24	3.99	1.44	0.96
-cervical lateral flexion:	6.97	4.54	1.51	0.98
-cervical rotation:	6.84	6.73	1.90	1.34
Upper trapezius: -standing at rest:	15.07	5.47	5.20	2.24
-cervical rotation:	5.36	4.12	2.44	3.10

Further injections (400 units) have been carried out every 3 months for 11 sessions to date without any significant complication. She estimates it alleviates pain by 75%.

Case #2: A 38 year-old former shipper presented with persistent low back pain despite previous surgery (L4-5 laminectomy/discectomy 1998). Past health included multiple knee arthroscopies, nasal surgery, obstructive sleep apnea. He smoked 1ppd. EMG studies: absent left H reflex only. Bone scan: degenerative changes at left L5-S1, both knees, shoulders, wrists, s-c joints, DIPs(feet). Physical exam: BMI (6’ 4”, 192 lbs), BP 102/57. Palpation revealed tender taut bands in left lumbar paraspinals with low algometry pain thresholds (2.3-2.5kg). BTX-A(200 units) was injected into these muscles.



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<u>Outcome measure</u>	<u>Pre-injection:</u>	<u>Three months post-injection:</u>
VAS pain	8/10	2/10
Short-form McGill PainQ.	28/45	8/45
Oswestry Back PainQ.	28/50	23/50
InclinometryROM:		
flexion/ extension:	59 / 08	85 / 29
left / right lateral flexion:	22 / 25	32 / 37
left / right rotation:	19 / 22	28 / 35
Dynamometry(lbs.)		
Chaitillon squat lift:	153	252
Jamar grip: left / right:	80 / 103	93 / 101
Surface EMG RMS amplitudes (uV)		
L4-5 paraspinals:	left right	left right
Sitting at rest:	5.07 1.75	1.14 1.14
Standing at rest:	11.80 3.63	3.98 5.11
Flexion-relaxation response:	Abnormal	Normal

Further injections of BTX-A (300 units) have alleviated pain by 85%.

Conclusion: Surface EMG results were consistent with standardized outcome measures and may be a useful physiological tool to follow clinical response to BTX-A.



031

COMPARISON OF DISABILITY AND COMMUNITY INTEGRATION FOR PERSONS WITH DIFFERENT TYPES OF INSURANCE COVERAGE 1 MONTH POST MILD TRAUMATIC BRAIN INJURY

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Objectives: To compare the functional abilities and community integration of mild traumatic brain injured persons with comprehensive, extended and non-extended health insurances at 1 month post injury.

Design: Prospective Cohort study

Setting: Emergency department (2 sites) within a tertiary hospital

Participants: Persons age 18 to 69 presenting to an Emergency Department with the diagnosis of mild traumatic brain injury.

Methods: Charts of eligible patients presenting to the Emergency Department were abstracted weekly and contacted by study nurses to participate in a prospective follow-up study at 1 month, 6 months and 1 year following injury. Comprehensive evaluation included neuropsychological screening tests, measures of symptoms, instrumental activities of daily living, community integration, quality of life and structured interview to explore comorbid diagnoses such as depression, acute traumatic stress disorder and /or alcoholism. Groups were identified based on insurance coverage (comprehensive (motor vehicle, WSIB), extended (employment benefits) or none (other than basic provincial coverage)). Analysis was completed with one-way ANOVA.

Results: Over a 15 month period 141 participants were recruited. 46 had comprehensive, 64 had extended and 31 had no additional insurance coverage. The comprehensive insurance group (primarily represented by motor vehicle related injury) demonstrated decreased overall functioning ($p=0.003$) compared to the other 2 groups. Community integration was also lower for the comprehensive insurance group compared to participants with extended coverage ($p=0.012$). Further analysis suggests that pain and decreased physical functioning are the primary explanation for these differences in functioning.

Conclusions: At one month post mild traumatic brain injury, persons with comprehensive insurance have decreased functional abilities and community integration compared to persons with less extensive coverage. The explanation for these differences may be related to the mechanism of trauma.



032

A PROSPECTIVE OUTCOME STUDY ON THE EFFECTS OF RADIOFREQUENCY NEUROTOMY FOR PATIENTS WITH CHRONIC SPINE PAIN OF FACET JOINT ORIGIN

R. Burnham MD, S. Holitski BScPT

Objective: To evaluate the effects of medial branch radiofrequency neurotomy (RF) on pain, disability, satisfaction and cost in subjects with chronic spine pain of facet joint origin.

Method: A total of 86 facet joints (11 cervical; 75 lumbar) were treated in 40 subjects (mean age 54 years; 25 female; 15 male). Mechanical spine pain was deemed to be predominantly of facet joint origin based on > 50% relief of pain for at least the duration of the local anesthetic following medial branch nerve blocks or intra-articular facet injections on 2 occasions. Questionnaire data were recorded twice (at least two months apart) prior to and at 1, 3, 6, 9 and 12 months post RF. The questionnaire gathered information regarding pain intensity (Visual Analogue Scale - VAS) and frequency, disability (Oswestry and Neck Disability Index Questionnaires for low back and neck pain respectively), satisfaction (of medical care and the RF procedure) and costs (direct and indirect) related to their spine pain. Data were analyzed using repeated measures ANOVA.

Results: none of the outcome measures were significantly different at the 2 different times prior to RF. At 1, 3, 6, 9 and 12 months post RF, there was a significant improvement in pain severity, frequency and related disability. At 3, 6, 9 and 12 months post RF there was a significant reduction in spine pain associated costs.

	Pre RF		Months Post RF				
	1	2	1	3	6	9	12
Pain Severity (VAS)	7.2	7.2	4.5	4.1	4.8	5.8	6.0
Pain Frequency	5.3	5.3	3.8	3.4	4.0	4.5	4.6
Disability	68	71	53	51	58	62	60
Cost (\$/month)	1747	1783	1457	1341	1275	1294	1241

At 3, 6, 9 and 12 months post RF, satisfaction with medical care had significantly improved. Overall, subjects were moderately or very satisfied with the RF procedure 66%, 80%, 76%, 74% and 78% of the time at 1, 3, 6, 9 and 12 months post procedure respectively. There were no reported complications.

Conclusions: Facet joint RF results in a significant reduction of mechanical spine pain frequency and severity, associated disability, cost and medical care dissatisfaction for at least 12 months. Most patients are satisfied with the procedure.



033

A COMPARISON OF FOUR CLINICAL METHODS USED TO LOCALIZE PAIN GENERATING FACET JOINTS

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Objective: to compare the accuracy of 4 commonly used clinical techniques designed to localize pain generating facet joints

Method: 20 subjects with chronic single level facetogenic spine pain participated. They were selected based on their response to 2 separate fluoroscopically guided blocks of the medial branches of the posterior rami from which they experienced at least 80% pain relief for a duration concordant with the local anesthetic agent used (lidocaine versus bupivacaine). At a later date, each subject was independently evaluated by a physiatrist, physical therapist with manual therapy training and a chiropractor. These clinicians were informed only of the subject's general area of spine pain (cervical, thoracic or lumbar) and were asked to conduct an assessment to determine the most likely single symptomatic vertebral level. The physiatrist used a pressure dolorimeter to identify the point of maximal tenderness (PMT); the physical therapist did a motion palpation examination (MPE) without subjective feedback from the subject and the chiropractor performed surface electromyography (sEMG) and thermography (sTHERM) assessments.

Results: sensitivities were: sEMG 45%; MPE 45%; PMT 35% and sTHERM 25%. When expressed as the average number vertebral levels away from the proven symptomatic level, the clinical methods were: sEMG .85; MPE 1.0; PMT 1.25 and sTHERM 1.3. When there was concordance between the sEMG and MPE or the sTHERM and MPE findings, the sensitivity was 75%.

Conclusion: of the 4 clinical methods compared, surface electromyography most accurately localized the vertebral level of facetogenic spine pain.



046

EFFECT OF TIME TO REHABILITATION ON FUNCTIONAL OUTCOME IN STROKE

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Given that most functional recovery occurs within 3 months of first-time stroke for all but the most severely affected patients, the amount of time between stroke onset and admission to rehabilitation may affect functional outcome such that shorter intervals are associated with better results. Length of rehabilitation stay (LOS), admission and discharge FIM scores, change in FIM and FIM efficiency (FIM change/LOS) were recorded for 435 patients admitted to a stroke rehabilitation program from 1997 – 2001 following a first unilateral hemispheric stroke. For analysis, patients were grouped by interval from stroke event to rehabilitation admission (≤ 30 days vs. 31-150 days). Mean age in both groups was 69.6 years. Gender, age, side of lesion and stroke type (ischemic or haemorrhagic) were entered as covariates in a multivariate analysis to examine group differences in FIM measures and LOS. Age was the only significant covariate identified reflecting an inverse relationship between age and FIM scores. On the adjusted model, significant differences were found between groups on all variables with the exception of FIM change. Patients admitted after 30 days post-stroke had greater LOS, lower admission and discharge FIM scores and lower associated FIM efficiency scores. Patients with more severe deficits admitted after 30 days can still make similar functional gains in rehabilitation to those patients with less severe deficits admitted within the 30 days of stroke although at a slower pace. Closer examination of the characteristics of patients referred for early vs. later admission to stroke rehabilitation is indicated.



047

THE MOST FREQUENTLY CITED OUTCOME MEASURES AMONG RANDOMIZED CONTROLLED TRIALS EVALUATING STROKE REHABILITATION THERAPIES

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The WHO International Classification of Functioning, Disability and Health (ICF 2001) identifies three primary levels of human functioning -- the body or body part, the whole person and the whole person in relation to his/her social context. When applied to outcome assessment in stroke rehabilitation, the ICF conceptual framework can be used to place outcome measures into one of the three categories depending upon what it is they purport to measure: Body functions/structure (impairments); Activities (difficulties in completing activities or tasks) and Participation (barriers to the involvement of an individual in a life situation or role). Primary and secondary outcome measures were identified and compiled from all randomized controlled trials (RCTs), published between 1968-2001, evaluating treatments associated with stroke rehabilitation. From 310 RCTs identified, the most frequently cited outcome measures (≥ 5 citations) in descending order of frequency were: the Barthel Index (76), the Fugl-Meyer Assessment (25), the Ashworth Scale (20), Functional Independence Measure (19), Frenchay Activities Index (17), Nottingham EADL (15), Nottingham Health Profile (15), Timed walk measurements (13), Mini Mental State Exam (11), Action Research Arm test (10), General Health Questionnaire (10), Hospital Anxiety and Depression Scale (10), Motor Assessment Scale (9), Medical Outcomes Study Short Form 36 (9) and the Rivermead Mobility Index (9). These measures were cited a total of 305 times. Of these 305 outcome measure citations, 108 (35.4%) were impairment level measures and 168 (55.1%) were activity (disability) level assessments. Relatively few studies employed measurement tools to assess outcomes at the level of participation (9.5%).



048

MEASURES OF FUNCTIONAL MOBILITY OUTCOMES FOLLOWING STROKE

K. Salter, J. Jutai, N. Foley, J. Bitensky, R. Teasell

Rigorous quantitative and practical methods are needed for measuring the effectiveness of therapeutic interventions, which are directed towards the achievement of independent, functional mobility following stroke. From among those instruments having adequate psychometric properties, the measure of choice may depend on the care setting, the clinical economy of the measure, and its sensitivity to important components of maintenance strategies, such as assistive devices. Three common measures of functional mobility following stroke were assessed, including the Berg Balance Scale, the Functional Independence Measure (FIM), and the Clinical Outcomes Variables scale (COVS) were assessed through chart review. The COVS is a 13-item assessment of functional mobility, which includes a range of motor tasks typically assessed and retrained by physiotherapists. Unlike many assessments that include functional mobility, the COVS assesses environmental barriers, transfer abilities (from both bed and floor), and the use of assistive devices in performing test items. Scores at admission and discharge, as well as change scores, were compared for all three measures for 261 patients admitted consecutively to a stroke rehabilitation program in 2002 – 2003. Mean scores for the three measures were significantly intercorrelated, and equally correlated with length of stay (LOS). Linear regression analysis confirmed that the addition of the Berg and the FIM did not contribute significantly to the ability of the COVS to predict LOS. The COVS appears to be less well studied than more popular measures like the Berg and the FIM. Our findings suggest it should receive more research attention.

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049

RECOVERY AND COMPLICATIONS IN ISCHEMIC VERSUS HEMORRHAGIC STROKE PATIENTS

David Lipson

Objective: To compare recovery and complications in hemorrhagic and ischemic stroke patients admitted for rehabilitation.

Methods: Data was collected retrospectively on 819 consecutive stroke patients admitted for rehabilitation at three London, Ontario stroke rehabilitation units (including a slow-stream unit) from 1997 to 2001. The patient data collected included age, length of hospital stay, time to admission, medical complications while in rehabilitation, risk factors for the development of complications, and ambulation status and FIM scores on both admission and discharge.

Results: Of 819 stroke patients, 110 were hemorrhagic and 709 were ischemic in origin. The hemorrhagic stroke patients were younger (66 vs 70 years, $p=.001$) and were admitted later post symptom onset (30 vs 18 days, $p<.0001$). They also had a higher incidence of pneumonia (6.4% vs 2.3%, $p=.04$), pulmonary emboli (3.6% vs .07%, $p=.006$) and wheelchair ambulation on admission (53% vs 41%, $p=.026$). However, there was no significant difference in the length of rehabilitation stay, the percentage of wheelchair ambulators on discharge, or FIM scores on both admission and discharge. Surprisingly, there was no significant difference in the incidence of seizures while on rehabilitation.

Conclusions: Compared to ischemic stroke patients, hemorrhagic stroke patients took much longer to enter into rehabilitation and were more susceptible to developing complications. Despite that, there was no significant difference in length of stay or functional improvement while in rehabilitation.



2004 Resident Essay Contest Winner – Dr. David Flaschner

040

PHARMACOTHERAPY FOR PROPHYLAXIS OF NEUROGENIC HETEROTOPIC OSSIFICATION

David Mark Flaschner, Edmonton, AB

Neurogenic heterotopic ossification (NHO) is a relatively common complication of central nervous system (CNS) injury. This article examines the current evidence for prophylaxis of NHO following CNS injury.

Methods: A thorough review of all available electronic databases as well as a bibliographic survey of all relevant articles was undertaken. The authors of pertinent articles were also contacted for additional unpublished data. Articles were described and critically appraised.

Results: Evidence for indomethacin, etidronate and warfarin exists. Of 384 articles, five were identified which address the prophylaxis of NHO prior to identifiable findings on radiographic studies. The literature is however of limited methodological quality.

Conclusions: There is data to support the efficacy of prophylaxis of NHO but it currently does not meet the expected standards for evidence-based systematic reviews. Regional practice guidelines will define practice patterns and further investigation is required to ensure efficacy and safety prior to adopting more definitive recommendations.



2004 Resident Research Contest Winner - Dr. Nancy Dudek

042

DERMATOLOGIC CONDITIONS ASSOCIATED WITH USE OF A LOWER EXTREMITY PROSTHESIS

NL Dudek, MB Marks, SC Marshall, JPW Chardon

Objectives: The objectives of this study were to: 1) document the frequency of skin problems among lower limb prosthetic users and 2) assess for factors associated with skin problems among patients using a prosthesis.

Methods: A six-year retrospective chart review using physician clinic notes of all lower extremity prosthetic users who were assessed in the outpatient amputee clinic at The Rehabilitation Centre in Ottawa, Canada was performed. Information was collected about the amputee, their prosthesis and the presence or absence of any skin problems. Descriptive and non-parametric statistics were used to analyze data.

Results: Seven hundred and forty five subjects with a total of 828 lower extremity amputations were included. Three hundred and thirty seven (40.7%) residual limbs had at least one skin problem. Adjusted odds ratios demonstrated that amputation level, being employed, type of walking aid and absence of peripheral vascular disease (as a co-morbidity) were independently associated with the presence of at least one skin problem ($p < 0.05$).

Conclusions: Dermatological conditions are a frequent complication for the lower extremity amputee who uses a prosthesis. The results suggest that more active amputees have an increased risk for developing skin problems. Further study in this area is warranted.



2004 Medical Student Essay Contest Winner - Ms. Anne Conlin

037

CHRONIC LOW BACK PAIN: A REVIEW OF EVIDENCE-BASED APPROACHES TO TREATMENT

Anne Conlin

Year III

Doctor of Medicine Program

University of Western Ontario

Low back pain is one of the most common problems a healthcare provider will encounter. Moreover, low back pain is often a chronic condition and presents considerable direct and indirect costs to society. A multitude of healthcare providers treat low back pain in a variety of different ways. The Cochrane Collaboration has completed systematic reviews on treatment modalities employed through allopathic medicine interventions, complementary medicine interventions, and multidisciplinary interventions. In six of the eight reviews published by the Cochrane Collaboration on chronic low back pain, the authors state that the number of high quality randomized controlled trials was insufficient for the reviewers to draw conclusions. However, massage therapy was deemed effective at least one year after treatment. Bio-psycho-social rehabilitation programs of at least 100 hours duration are also effective. The importance of conducting large, well-designed trials to determine the utility of other interventions for low back pain is stressed.



2004 Student Research Contest Winner – Ms. Anne Conlin

044

TREATMENT OF WHIPLASH-ASSOCIATED DISORDERS: A META-ANALYSIS AND SYSTEMATIC REVIEW

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Background: Whiplash-associated disorder (WAD) is a term used to describe injury due to an acceleration-deceleration mechanism about the neck. WAD represents a very common and costly condition. In 1995, the Quebec Task Force published a report that contained evidence-based recommendations regarding the treatment of WAD based on studies completed prior to 1993, as well as consensus-based recommendations.

Objective: To provide a meta-analysis and systematic review of the literature published between January 1993 and July 2003 on interventions for WAD.

Methods of the Review: Randomized controlled trials (RCT) and epidemiological studies were categorized by treatment modality and analyzed by outcome measure. Methodological quality of the RCTs was assessed. When possible, pooled analyses of the RCTs were completed for meta-analyses of the data. Results of all studies were compiled and systematically reviewed.

Results: Studies were categorized into activation-based, medical-based, and surgical-based interventions. A total of 15 RCTs were evaluated, including one of poor methodological quality. Pooled analyses were completed across all treatment modalities and outcome measures. Strong evidence supported mobilization for acute WAD and radiofrequency neurotomy for chronic WAD.

Conclusions: Important RCTs and epidemiological studies have been published since 1993. Implications for clinical practice and research are discussed.