



57th ISCoS



Abstract Book Rapid Fire

The 57th ISCoS Annual Scientific Meeting
combined with the 25th ANZSCoS ASM

13 - 15 September 2018
ICC Sydney, Australia



Occupational participation among Bangladeshi with Spinal Cord Injury transitioning to living in their home after discharge from rehabilitation

Mr Yeasir Alve^{1,2}, Dr Peter Bontje³

¹Lecturer in Occupational Therapy, CRP, Savar,, Bangladesh, ²PhD Student, Arakawa-Ku, Japan, ³Prof, Arakawa-ku, Japan

Rapid Fire - Delivery of SCI Care in Rural and Low-Resource Settings, Room C2.1, September 15, 2018, 08:00 - 08:55

Background: It is important to understand how occupational participation might be a resource to develop innovative community support programs for Bangladeshi with SCI to empower them to achieve stable health and well-being.

Objectives: The study aimed to explore and understand how occupational participation unfolds among Bangladeshi with spinal cord injury after returning back to home from in-patient rehabilitation.

Methodology: An ethnographical research design was selected to understand participants' transitional experiences of occupational participation as complex cultural phenomena. 18 participants were recruited following purposive sampling techniques. They were interviewed twice, with additional observations of their living environment. Data-gathering typically took 1 – 1:30 hours. Data were analyzed using a combination of narrative thematic analysis and narrative slopes. A research ethics review board approved this study (17051). All participants participated voluntarily and gave their informed consent.

Result: Both positive and negative developments and response patterns were identified and these occurred simultaneously. However, positive transitional change was characterized by being supported and dreaming, desiring, reconstructing, socializing and stabilizing response patterns. Conversely, transitions were constrained by illness, conflict, boredom, burden, and despairing responses. Moreover, the physical environment, access to health care, financial resources, assistive technologies and relationships are key resources determine health and wellbeing. Where health complications, re-hospitalization, getting/losing jobs, marriage/divorce, separation, death and reconstituting house are the major turning points during transitional period.

Conclusion: These results should be helpful in developing community-based support to promote participation in occupations during transitional period after returning home for Bangladeshi with SCI. This knowledge can also inform better discharge planning and health professionals involvement to prepare for successful transitions and to enhanced occupational participation.

How non-traumatic spinal cord injury changes people's social and community participation

Dr Linda Barclay¹, Dr Primrose Lentin¹, Assoc Prof Rachael McDonald², Assoc Prof Helen Bourke-Taylor¹
¹Monash University, Frankston, Australia, ²Swinburne University, Melbourne, Australia

Rapid Fire - Living Well with SCI, Room C2.5, September 15, 2018, 08:00 - 08:55

Introduction

Incidence of non-traumatic spinal cord injury in Australia is increasing, meaning there will be more people living with the consequences of non-traumatic spinal cord injury in the future. The profile of people with non-traumatic spinal cord injury differs from people with traumatically acquired spinal cord injury, and their long term health and well-being outcomes are not known. The aim of this study was to explore the experience of returning to social and community participation following non-traumatic spinal cord injury.

Methods

Qualitative methods were used for this study. Semi-structured interviews were conducted with 17 people with non-traumatic spinal cord injury who had returned home. Data were analysed inductively utilising the thematic analysis method.

Results

The process of returning to social and community participation following non-traumatic spinal cord injury was identified as occurring in three main stages: withdrawal; re-emergence into society; and stability. Each stage consisted of adaptation and adjustment in a number of areas, including: the loss of independence; the experience of being out in public; social networks; participation in productivity roles; and expectations regarding satisfactory social and community participation. Many of the participants had developed or were developing strategies to manage the adjustments that they needed to make.

Conclusions

By using a qualitative approach, this study adds to the understanding of the adjustment process experienced by people following non-traumatic spinal cord injury when they return to living in the community. Health professionals can assist people with non-traumatic spinal cord injury to adjust to changes in their independence, to modify their expectations regarding how they will participate in the community, to assist them to find new meaningful roles, and to facilitate development of social networks to replace lost ones thereby facilitating improved health and well-being.

Testing a behavior change strategy to promote best evidence-based management of the neurogenic bladder following spinal cord injury

Assoc Prof Peter Bragge¹, Dr Denise Goodwin¹, Ms Alyse Lennox¹, Ms Catherine Byrne², Dr Andrew Nunn²

¹*Behaviourworks Australia, Monash Sustainable Development Institute, Monash University, Clayton, Australia,*

²*Victorian Spinal Cord Service, Austin Health, Heidelberg, Australia*

Rapid Fire - Bowel and Bladder, Room C2.4, September 14, 2018, 13:45 - 15:15

Introduction

Spinal cord injury (SCI) results in neurogenic bladder, which increases risk of urinary tract infections (UTIs) – the largest single cause of SCI re-presentation to ED. Optimal neurogenic bladder care can reduce UTI risk, improving quality of life and reducing hospital and insurer costs. This project aimed to trial an evidence-based model of acute SCI bladder care in the Victorian Spinal Cord Service (VSCS).

Methods

- Evidence review and expert consultation found that intermittent catheterisation results in lower rates of UTI and is recommended over indwelling catheterisation
- A practice audit of 143 patients found that the median time to indwelling catheter removal was 67 days
- Qualitative interviews with spinal consultants, doctors, nurses, inpatients with SCI and allied health professionals revealed that beliefs about patient readiness; access to information resources; inconsistency in catheterisation technique; and other social influences were barriers to optimal SCI bladder management.

Based upon the above findings, a multi-faceted intervention was developed:

- A 1-page algorithm summarising best evidence-based practice;
- Training of all nursing staff to standardise catheterisation practice;
- Change champions to support best practice in acute and rehabilitation wards; and
- An online patient information resource, mybladdermylife.com

Results

Following a 3-month trial of the behavior change strategy, median time to indwelling catheter removal was 19.5 days – approximately one-third of the pre-implementation rate.

Conclusion

This theory-informed behavior change strategy positively impacted bladder care following acute SCI. Information from an in-depth qualitative evaluation and trials in other jurisdictions can enhance understanding of the impact and transferability of this strategy.

Spinal Cord Injury rehabilitation outcomes in Australia and New Zealand – the impact of AROC benchmarking

Ms Frances Simmonds¹, Ms Tara Alexander¹, Ms Jacquelin Capell¹

¹*University Of Wollongong, Wollongong, Australia*

Rapid Fire - Functional Outcomes, Room C2.3, September 15, 2018, 08:00 - 08:55

INTRODUCTION

Spinal cord injury (SCI) rehabilitation enables those who have experienced a SCI to maximise their abilities and achieve optimal functioning. In Australia, many states are in the process of reviewing, or have just reviewed, their models of care for SCI rehabilitation.

The Australasian Rehabilitation Outcomes Centre (AROC), established in 2002, is the rehabilitation medicine clinical registry for Australia and New Zealand. AROC collects standardised data against each inpatient rehabilitation episode of care, including traumatic and non-traumatic SCI. This data is used to create benchmark reports twice a year and to support discussions between specialist SCI rehabilitation re variations in outcomes and the processes that underpin them.

METHODS

All specialist SCI (and all non-specialist) rehabilitation units submit data to AROC. AROC analyses outcomes achieved by each unit as well as the influences on outcomes of factors such as age, time between injury and admission to rehabilitation, Functional Independence Measure (FIM) scores at admission, level of injury and AIS score.

RESULTS

In 2017 half of the 1,305 SCI episodes were treated in a specialist unit — most traumatic spinal cord injury (TSCI) patients were treated in specialist units (69%).

In comparison to non-specialist units, specialist units treat younger patients and admit lower functioning patients. While the median LOS for all SCI patients treated at specialist units has declined over the past five years, it is still significantly longer than non-specialist units. Specialist units achieve greater relative functional improvement.

CONCLUSIONS

In an environment where models of care for SCI rehabilitation are under review having access to national comparative data is key for both clinicians and policy makers. Improvements in SCI rehabilitation outcomes, as demonstrated through benchmarking and annual workshops, clearly show using current data is important to underpinning the continued development of models of care.

Osteoporotic Fractures after spinal cord injury: a clinical-epidemiological analysis in a case series of 20 years 1997-2016

Dr Ana Paula Champs¹, Dr Gustavo Correa Netto Melo¹, Mrs Gabriela Afonso Galante Maia¹, Mrs Fabiana Gonçalves Oliveira¹, Dr Maria Marta Sarquis Soares²

¹Hospital Sarah, Belo Horizonte, Brazil, ²UFMG, Belo Horizonte, Brazil

Rapid Fire - Miscellaneous Medical 1, Room C2.4, September 14, 2018, 08:35 - 09:30

Introduction: After spinal cord injury (SCI), osteoporotic fractures is an important health problem for SCI patients and may lead to complications and worse daily life activities and increase mortality. **Methods:** Case series in a sample of SCI patients with osteoporotic fractures admitted from January 1997 to December 2016 in a rehabilitation hospital. For data we used International Spinal Cord Injury Fracture History Extended Data Set. **Results:** 305 patients were select by inclusion and exclusion criteria, 53,7% masculine, paraplegics (79,3%), thoracic neurological level (58,2%), mean age 41 years, 17% smokers. Median time between SCI and fracture was 12,5 years. The most frequent mechanism was fall (60.6%), 22,5% fall from wheelchair and 29,2% fall from own height. The frequent fractured sites were tibia and /or distal fibula (28.5%), distal femur (26,5%) and proximal femur (27,5%). Fractures occurred mostly at home. Most of patients were hospitalized (51.2%) and 44.5% had surgical treatment. Complications were 21,7%, described as deformity, pseudoarthrosis and infection. About 28,6% reported worse performance in daily life activities after fracture and 31,8% had worse or loss of gait ability. Seven years after the first fracture, 20.7% of the individuals had a second fracture and 5 (2%) patients even had the third fracture. 25-OH D mean level was 26 ng/ml. Only 9 patients (2.7%) performed densitometry and 20 (7.2%) underwent bisphosphonate treatment. **Conclusion:** Patients with osteoporotic fractures after SCI had worse performance in activities of daily living and walking capacity. Most of them were hospitalized. Osteoporosis after SCI is most of the time neglected by the patients and their physicians. There is no specific guidelines for this population, and little is done to prevent fractures. Understanding clinical and epidemiological profile of this population can help to identify risk factors and to set prevention programs and appropriate treatment.

The novel use of telehealth in spinoplastics clinics

Dr Priya Chari¹

¹*Rnsh, Sydney, Australia*

Rapid Fire - Miscellaneous Medical 2, Room C2.3, September 14, 2018, 13:45 - 15:15

The novel use of telehealth in spinoplastics clinic

Chari P1, Lavrencic L1 Gates R1

1 Spinoplastics service, Royal North Shore Hospital (RNSH), St Leonards, NSW Australia

BACKGROUND AND AIM(S)

The long periods of bed rest and restricted mobility for spinal cord injured (SCI) clients with pressure ulcers can prove to be fairly challenging to access any hospital and medical appointments. We report the increasing use of a new model of care in augmenting the care of this patient cohort at our spinal unit.

METHOD

Telehealth providing video-consulting through secure web-based and real time communication solution was implemented as a pilot in multispecialty and multi-disciplinary spinoplastics clinics. Clinicians were based at RNSH and clients were in their home environment or at their local hospital often with their local providers and families.

RESULT(S)

56 videocalls were conducted during a 2 year period through the spinoplastics outpatient service. Most (90%) telehealth consultations were conducted at point of original referral and facilitated early multi-disciplinary assessment and management. The ability to link all the key clinicians enabling efficient live communication was consistently reported. The subsequent planning of care episodes/hospitalization with times to surgery/inpatient assessments improved with the use of telehealth consultations. All post discharge reviews in rural and remote clients were conducted through telehealth. Travel and medical transportation costs were decreased for all clients. 25% of clients resided in major cities which are currently considered ineligible for telehealth consultations under the Medicare benefits scheme (MBS).

CONCLUSION(S)

Telehealth is an effective tool in the use of pressure injury management in spinal cord injured clients. The MBS telehealth eligibility does not consider the severe restricted mobility status of SCI patients with pressure areas.

REFERENCES

1. Healthdirect Australia – access to the video consulting program, ‘Healthdirect Video Call’. www.healthdirect.gov.au

Access to Timely Care for Spinal Cord Injury: A Survey of SCI Acute and Rehabilitation Models of Care Worldwide

Ms Christiana Cheng¹, Dr Aidin Abedi², Dr Aurelian Anghelescu³, Dr Fin Biering-Sørensen⁴, Dr Harvinder S. Chhabra⁵, Dr Angel Gil-Agudo⁶, Dr Júlia Greve⁷, Dr Nasser Mehrab Khan⁸, Dr Kenny Kwan⁹, Dr Nan Liu¹⁰, Dr James Middleton¹¹, Dr Sasa Moslavac¹², Dr Alpesh Patel¹³, Dr JG Prévinaire¹⁴, Dr Vafa Rahimi-Movaghar¹⁵, Dr Rowan Schouten¹⁶, Dr Giorgio Scivoletto¹⁷, Dr Susan Urquhart¹⁸, Dr Aki Vainionpää¹⁹, Dr Vanessa Noonan¹, ACT International Working Group¹

¹Rick Hansen Institute, Vancouver, Canada, ²Department of Orthopaedic Surgery, Keck School of Medicine, University of Southern California, Los Angeles, USA, ³Teaching Emergency Hospital "Bagdasar-Arseni", Bucharest, Romania, ⁴Clinic for Spinal Cord Injuries, Rigshospitalet, University of Copenhagen, Copenhagen, Denmark, ⁵Indian Spinal Injuries Centre, New Delhi, India, ⁶National Hospital for Paraplegics, Toledo, Spain, ⁷Medical School University of São Paulo, São Paulo, Brazil, ⁸Orthopedic Department, Hamad General Hospital, Doha, Qatar, ⁹Department of Orthopaedics and Traumatology, Li Ka Shing Faculty of Medicine, The University of Hong Kong, Pokfulam, Hong Kong, ¹⁰Department of Rehabilitation Medicine, Peking University Third Hospital, Beijing, China, ¹¹John Walsh Centre for Rehabilitation Research, The University of Sydney, Sydney, Australia, ¹²Spinal Unit, Special Hospital for Medical Rehabilitation, Varaždinske Toplice, Croatia, ¹³Middlemore Hospital, Auckland, New Zealand, ¹⁴Centre Calvé, Fondation Hopale, Berck, France, ¹⁵Sina Trauma and Surgery Research Center, Sina Hospital, Tehran University of Medical Sciences, Tehran, Iran, ¹⁶Burwood Spinal Unit, Christchurch, New Zealand, ¹⁷Spinal Unit and Spinal Rehabilitation lab, IRCCS Santa Lucia Foundation, Rome, Italy, ¹⁸Queensland Spinal Cord Injuries, Brisbane, Australia, ¹⁹Oulu University Hospital, Oulu, Finland

Rapid Fire - Systems of Care, Room C2.5, September 14, 2018, 08:35 - 09:30

Introduction:

Access to timely care after traumatic spinal cord injury (TSCI) and throughout rest of life is critical to optimize outcomes. Recommendations (e.g. International Perspectives on SCI) have been published but SCI models and processes to ensure timely access are not well documented. The objective was to delineate processes across participating acute and rehabilitation care facilities worldwide.

Methods:

A 130-item survey on service/treatment availability, resources, and processes was used. Process indicators reflecting care delivery were: triage protocol for TSCI admission to ensure prompt access to specialized care; performing International Standards for Neurological Classification of SCI (ISNCSCI), availability of CT/MRI scanners 24/7 to enable rapid assessment upon hospital arrival; spine surgeon on-call 24/7 to support early surgery; providing rehabilitation (including access to rehabilitation physicians) during acute phase; access to mental health (e.g. depression, post-traumatic stress disorder) services, peer counsellors, and follow-up services to support ongoing care.

Results:

Survey was completed by 47 facilities (49% acute, 51% rehabilitation) from 6 continents. 15% of facilities were from low to lower-middle income countries. Over 50% of acute facilities have protocols for TSCI admissions. 48% use ISNCSCI to classify TSCI but most have access to imaging (CT, 70%; MRI, 78%) and spine surgeons (86%). All acute facilities offer rehabilitation services and 83% have access to rehabilitation physicians. 91% have services to detect and treat mental health but only 38% involve a peer counsellor. 90% of facilities provide follow-up services; though only 38% provide life-long (>10 years) follow-up. Differences between high and low-income countries were observed (e.g. triage practice: 67% vs 20%).

Conclusion:

Processes to access early specialized care were generally present, but gaps exist (e.g. triage practices, follow-up care). Future harmonised data collection of patient-related outcomes with indicators will identify optimal attributes of SCI care and inform care standards such as accreditation. Recommended next steps and future directions will be discussed.

The utility of pre-hospital mean arterial pressure as a strong negative predictor of ASIA Impairment Scale (AIS) in acute traumatic spinal cord injury.

Assoc Prof Jillian Clark^{1,2,3}, Dr Mike Anderton¹, Dr Shabnan Torabiardakani¹, Dr Prashanth Rao¹, Prof Brian Freeman^{1,2,3}

¹Spinal Services, Royal Adelaide Hospital, Adelaide, Australia, ²Centre for Orthopaedic and Trauma Research, School of Medicine, Faculty of Health and Medical Sciences University of Adelaide, Adelaide, Australia, ³South Australian Health and Medical Research Institute, Adelaide, Australia

Rapid Fire - Functional Outcomes, Room C2.3, September 15, 2018, 08:00 - 08:55

Introduction: Calculated mean arterial pressure (MAP) has emerged as a physiological correlate of spinal cord blood flow and spinal cord perfusion pressure. Pre-clinical evidence, together with case reports of associations between MAP and electrophysiological signal, and between these correlates and neurological deterioration, encourage investigation of the occurrence of haemodynamic instability in both pre-hospital and tertiary settings.

Aims: To investigate relationships between acute haemodynamic parameters and the neurological status of SCI-ed patients.

Methods: Data were extracted from the medical records of new incident cases of traumatic SCI (C2-L1) admitted to the RAH between 2012 and 2016. Exclusions consisted of patients aged < 16 years and cases not retained to the RAH. Descriptive statistics and receiver operating characteristic (ROC) curves were applied to data aggregated by triage setting (pre-hospital, emergency department, or recovery), surgical decompression (triage time, surgery) and neurological outcome (tetra, para, AIS Grade A-E, and GCS score 0-15).

Results: 94 acute admissions were identified (X male, mean age X years, tetra 58 (63%), admission AIS A or B 28 (43.8%), GCS 14.1±2.7. Differences between pre-hospital, emergency department and recovery mean calculated MAP did not reach significance (87.0±19.9; 85.3±15.2; 95.5±16.2 respectively, each p>0.05). ROC plots confirmed the tie between of pre-hospital calculated Mean MAP and admission AIS grade [area under (AU)ROC 0.22, P= 0.01] and between this variable and calculated Minimum MAP AUROC 0.21, P=0.01, cut-off point 78). In contrast, time to surgical decompression (16.9±12.1 hours) satisfied the null hypothesis.

Conclusion: Our results encourage aggressive cardiopulmonary resuscitation, not just in tertiary settings, but of relevance to attempts to preserve viable peri injury tissue, across the care continuum. The statistical associations observed, along with the rapidly growing preclinical data-set, point towards a need for the implementation of pre-hospital guidelines in this context.

ReInventing Yourself after Spinal Cord Injury: Results from two randomized controlled trials

Ms Jennifer Coker¹, Ms Susan Charlifue¹

¹*Craig Hospital, Englewood, United States*

Rapid Fire - Living Well with SCI, Room C2.5, September 15, 2018, 08:00 - 08:55

For individuals with spinal cord injury (SCI), self-efficacy is essential for successful adjustment after injury, and enhances coping with the stressors experienced after injury that can lead to anxiety, depression, and poor satisfaction with life. We will review the results of two randomized controlled trials (RCT) of the ReInventing Yourself after SCI intervention, a structured cognitive behavioral approach that utilizes positive psychology concepts to challenge, reframe, and restructure individuals' thoughts and beliefs about their capabilities after SCI.

Participants were individuals with SCI who were at least one-year post discharge from rehabilitation (Study 1) and within six-months post-discharge from rehabilitation (Study 2). The primary outcome measure was self-report of SCI-specific self-efficacy, using the Moorong Self-Efficacy Scale (MSES); secondary outcomes included general self-efficacy, satisfaction with life, participation, depression, and anxiety. Participants were randomized to treatment or control groups and all measures were collected at specified follow-up timepoints. A mixed model analysis of repeated measures was used to compare scores between the groups and test the time by treatment interaction.

There were 81 participants in Study 1 and 46 participants in Study 2. Participants in both studies were predominantly white males and an average of 50.0 and 48.7 years old, respectively. Average time since injury for participants in Study 1 was 86 months post-injury; all participants in Study 2 were within six months of injury. For both studies, participants in the treatment group showed significantly greater scores on the MSES from baseline to six weeks (+4.67 and +7.67 points, respectively). Participants in Study 1 also showed significantly greater improvements in depression and anxiety, whereas participants in Study 2 showed significant improvements in satisfaction with life.

The findings from this study indicate that the six-week ReInventing Yourself after SCI intervention is effective in improving SCI-specific self-efficacy scores in people with acute and chronic SCI.

Practices and opinions on the utility of nerve transfers for upper extremity reanimation in tetraplegia – an international survey of surgeons and therapists.

Ms Catherine Cooper¹, Ms Natasha van Zyl¹, Ms Bridget Hill¹

¹*Austin Health, Melbourne, Australia*

Rapid Fire - Upper Extremity, Room C2.3, September 14, 2018, 08:35 - 09:30

Introduction

The introduction of nerve transfers has resulted in a paradigm shift for upper limb reconstructive surgery in tetraplegia. Here in Melbourne, we see earlier and more frequent presentation of patients considering surgery - usually within their in-patient rehabilitation admission. The addition of nerve transfers to the reconstructive toolbox gives more surgical options with combinations of nerve and traditional tendon procedures that we believe result in better outcomes.

While this is our experience, we were keen to explore that of other specialists in tetraplegic hand surgery. We developed an online international survey for clinicians in the field for presentation at the triennial Tetra Hand Conference in Switzerland in August 2018.

Method

Surgeons and therapists known to be working in the field of upper limb reconstructive surgery in SCI internationally were targeted and “snowballing” was encouraged to broaden the respondent base. The 20 minute survey aimed to provide a snapshot of current practices and opinions on the utility of nerve transfers for upper limb reanimation in SCI.

Results

The data from the international survey will be presented at the Tetra Hand Surgery conference in August where it will serve as a platform for discussion amongst practitioners. We offer the same presentation describing uptake of nerve transfer surgery updated with “breaking news” from the peak international body of clinicians.

Conclusion

The application of nerve transfer surgery in SCI is still in its infancy around the world with very few centres offering it as primary care. Australia is a world leader in the field with dedicated programs in Melbourne and Sydney that offer significant outreach. Current research is scant and it is unclear why this technique has been adopted by some and not others in the field. The purpose of the survey and this presentation is to share our knowledge about the current levels of uptake worldwide, and identify the barriers and facilitators moving forward.

Patterns of home care visits for individuals with spinal cord injuries

Dr Brian Chan¹, Ms Shawna Cronin¹, Dr Jennifer Voth¹, Dr Susan Jaglal^{1,2}, Dr B. Catharine Craven^{1,2}

¹Toronto Rehabilitation Institute, Toronto, Canada, ²Department of Physical Therapy, Toronto, Canada

Rapid Fire - Miscellaneous Medical 3, Room C2.5, September 14, 2018, 13:45 - 15:15

Background: Traumatic spinal cord injury (tSCI) is a substantial economic burden to health care systems. A large proportion costs are consumed in home health care services. A detailed description of home care use for tSCI individuals in Canada has not been previously examined. We describe patterns of home care visits for services provided by the Community Care Access Centres (CCAC) for individuals with tSCI in Ontario.

Methods: This retrospective observational study uses Ontario health care administrative data housed at the Institute for Clinical Evaluative Sciences. Individuals with a new tSCI discharged home between 2006 and 2010 and receiving home care were identified and followed up to 2 years post-discharge. Data on home care services accessed through the CCAC, initial inpatient acute hospitalization and inpatient rehabilitation and demographic information were collected and analyzed. Descriptive statistics were used to characterize the data.

Results: A total of 577 individuals were identified. We report on nursing and personal/homemaking which represents the largest proportion of services provided (19% and 75% respectively). In the first year, personal services/homemaking services increases from a median of 18 visits to over 30 visits over a 30 day period. By the second year, personal services/homemaking services range from a median of 30 to 40 visits per 30 day period. Nursing, on the other hand, remains consistent with a median of four to eight visits over a 30 day period in the first and second year.

Conclusion: An individual with tSCI receives between 48 to 70 hours of health care support from the CCAC per month in the community. This is likely a small proportion of the total home care required. Higher second year home care use may point to structural issues in home care service delivery. There may also be equity issues with service delivery based on level of impairment.

Restoring Bladder and Bowel Function by Electrical Stimulation without Rhizotomy

Prof Graham Creasey¹, Dr Dennis Bourbeau²

¹Stanford University, Palo Alto,, United States, ²Case Western Reserve University, Cleveland,, United States

Rapid Fire - Bowel and Bladder, Room C2.4, September 14, 2018, 13:45 - 15:15

Introduction

After suprasacral spinal cord injury (SCI), electrical stimulation of sacral anterior nerve roots can restore micturition on demand with low residual volumes of urine and improve constipation and defaecation. This has usually been combined with cutting sacral posterior nerve roots to

- i. reduce detrusor hyper-reflexia and reduce reflex incontinence
- ii. reduce sphincter hyper-reflexia and further improve micturition

However, cutting these nerves abolishes other desirable reflexes for sexual function, and is undesirable in people with SCI who have preserved sacral sensation. We are therefore investigating new methods of restoring bladder function by electrical stimulation without rhizotomy.

Methods

- i. Stimulation of sacral afferent nerves by implant or by skin electrodes to inhibit reflex contraction of the detrusor
- ii. High frequency stimulation of pudendal nerves to block conduction of action potentials and reduce contraction of the external urethral sphincter

Results

- i. In patients with chronic suprasacral SCI, sacral afferent stimulation by implant or by skin electrodes inhibited detrusor hyper-reflexia and in some patients increased bladder capacity into the normal range
- ii. In cats with chronic suprasacral SCI, high frequency stimulation blocked conduction rapidly and reversibly in the pudendal nerves, reducing sphincter contraction. When sacral anterior root stimulation was applied, without rhizotomy, high frequency stimulation of the pudendal nerves resulted in micturition with lower residual volumes of urine, lower average voiding pressures and higher urine flow rates. In a human subject with chronic suprasacral SCI, high frequency stimulation of the pudendal nerves by percutaneous electrodes reduced reflex contraction of the urethral sphincter.

Conclusions

- i. Detrusor hyper-reflexia can be reduced by sacral afferent stimulation
- ii. Sphincter hyper-reflexia can be reduced by high frequency conduction block

These techniques may have application in managing detrusor-sphincter dyssynergia, and may allow restoration of bladder and bowel emptying and continence using electrical stimulation without posterior sacral rhizotomy.

Assessment of energy requirements in acute spinal cord injury

Mrs Kate Desneves¹, Ms Maya Panisset², Ms Jillian Rafferty¹, Ms Helena Rodi¹, Dr Leigh Ward³, Dr Andrew Nunn¹, Dr Douglas Brown⁴, Prof Mary Galea²

¹Austin Health, Melbourne, Australia, ²The University of Melbourne, Melbourne, Australia, ³The University of Queensland, Brisbane, Australia, ⁴The Spinal Research Institute, Melbourne, Australia

Rapid Fire - Miscellaneous Medical 2, Room C2.3, September 14, 2018, 13:45 - 15:15

Background :Accurate assessment of energy needs is important in order to prevent under- and over-nutrition. **Aim:** This prospective observational study aimed to evaluate agreement between a gold standard measure of total energy expenditure (TEE), doubly labelled water (DLW) and six published equations for estimating energy requirements in acute spinal cord injury (SCI).

Method:Twenty participants (18 male) within 8 weeks post acute SCI completed DLW and dietary intake assessments. Fat free mass (FFM) and fat mass (FM) were calculated from total body water derived from deuterium elimination rates. Estimated energy requirements were predicted using Harris-Benedict, Schofield, Henry, Nelson et al, Buchholz et al. and Chun et al. equations multiplied by a combined activity and stress factor of 1.3.

Results: Median TEE was 2,164 kcal/day. Participants were meeting 107% of their TEE. Fair agreement was found between TEE and predicted energy requirements using the Chun et al. (CCC 0.39; 95% CI 0.13-0.60), Buchholz et al. (CCC 0.31; 95% CI 0.03-0.55) and Nelson et al. equations (CCC 0.35; 95% CI 0.07-0.58) that incorporate measures of fat free mass (FFM) and/or fat mass (FM), and the Harris-Benedict equation (CCC 0.30; 95%CI: -0.02-0.56). When outliers were removed (n=2), agreement between TEE and predicted energy requirements using Buchholz et al. (CCC 0.725; 95% CI 0.448-0.879) increased to substantial and Nelson et al. (CCC 0.53; 95% CI 0.14-0.78) and Chun et al. (CCC 0.53; 95% CI 0.16-0.77) increased to moderate.

Conclusion: The population-specific Buchholz equation that incorporates body composition measures demonstrated the best agreement when multiplied by a combined activity and stress factor of 1.3 in patients with acute SCI.

YIELD OF LOWER GI ENDOSCOPY PRIOR TO TRANSANAL IRRIGATION IN PATIENTS WITH SPINAL CORD INJURY

Dr Anton Emmanuel^{1,2}, Dr Valentina Passananti¹, Dr Angela Gall², Dr Natalia Zarate-Lopez¹, Mr Kumaran Thiruppathy¹, Mr Prateesh Trivedi¹

¹University College London Hospital, London, United Kingdom, ²London Spinal Cord Centre, Stanmore, UK

Rapid Fire - Bowel and Bladder, Room C2.4, September 14, 2018, 13:45 - 15:15

Introduction: The need for endoscopic evaluation prior to transanal irrigation (TAI) remains uncertain. Colonoscopic evaluation requires preparation which can be difficult for patients, it is costly and is associated with a risk of perforation. Inconvenience and risks are greater for colonoscopy than flexible sigmoidoscopy.

Method: We reviewed the records of 221 (127 male; mean age 48 years, range 18-83) patients with spinal cord injury (mean time since injury 9.4 years, range 0.9-31) who commenced TAI. A 5-point Likert scale patient-reported outcome assessed satisfaction with the procedure.

Results: Based on unit protocol and putative risks (age >45, bowel symptoms, previous anorectal surgery, family history) 175 (79%) underwent endoscopy: 77 underwent flexible sigmoidoscopy, 98 patients underwent colonoscopy (6 had both). Commonest abnormalities identified were diverticulosis (32/175, 18%), adenoma (25/175, 14%), significant haemorrhoids (19/175, 11%), anal fissure (5/175, 3%), ulcerative colitis (2/175) and sigmoid cancer 1/175. Based on endoscopy findings, TAI was cancelled in 3% patients (5/175 = 2 colitis, 1 diverticulitis, 1 adenoma, 1 cancer) and deferred in 17% (30/175 = 24 adenoma, 3 fissure, 3 haemorrhoids). All but one lesion was in the left colon. No perforation or severe haemorrhage occurred in any patient. Dissatisfaction was expressed by 78/98 (80%) colonoscopy patients and 13/77 (17%)

Conclusion: Lower GI endoscopy influenced TAI management in 20% of cases. Deciding on pre-treatment endoscopy should balance the risk of TAI-induced perforation with the risk and cost of endoscopy. These data suggest that since all but one lesions was identified within reach of a flexible sigmoidoscopy, which may be preferable to colonoscopy which was also less well tolerated.

Understanding the clinical management of obstructive sleep apnoea (OSA) in tetraplegia: a qualitative study using the theoretical domains framework (TDF)

Ms Marnie Graco^{1,2}, Prof David Berlowitz^{1,2}, Prof Sally Green³

¹*Institute for Breathing And Sleep, Melbourne, Australia*, ²*The University of Melbourne, Melbourne, Australia*, ³*Monash University, Melbourne, Australia*

Rapid Fire - Miscellaneous Medical 3, Room C2.5, September 14, 2018, 13:45 - 15:15

Introduction

Clinical practice guidelines recommend diagnostic testing for people with tetraplegia and symptoms of OSA, and treatment for OSA with positive airway pressure therapy. Yet little is known about how clinicians manage OSA in tetraplegia. The TDF is a commonly used set of 14 constructs for identifying determinants of clinical behaviours. The aims of this study were to describe how doctors are managing OSA in tetraplegia, and using the TDF, to identify the influencing factors.

Method

Semi-structured interviews were conducted, face-to-face or via videoconference, with 20 specialist doctors managing people with tetraplegia from spinal units in Europe, UK, Canada, USA, Australia and New Zealand. All interviews were audiotaped for verbatim transcription. OSA management practice types were categorised by dividing inpatient and outpatient practices into screening, diagnosis and treatment components. Data were thematically coded to the 14 constructs of the TDF. Common constructs were identified and comparisons made between participants with different practice types.

Results

Half of the doctors interviewed were routinely screening for OSA signs and symptoms. Most doctors referred to sleep specialists for OSA diagnosis (12/20 in inpatients; 13/20 in outpatients), and treatment (12/20 in inpatients; 16/20 in outpatients). Three spinal units managed all aspects of non-complicated OSA without sleep specialist referral. Relevant TDF constructs and themes included:

- Skills/Knowledge: doctors identified their limited ability to interpret diagnostic sleep tests and to prescribe treatments;
- Professional role and identity: doctors believe OSA management belongs to sleep specialists;
- Environmental context and resources: time constraints hinder routine screening.

The three units independently managing OSA were well resourced, had clinical champions who led the program, and had provided additional training for the multidisciplinary team.

Conclusion

Clinical management of OSA in tetraplegia is highly varied. Most doctors refer to sleep specialists for OSA management because they believe they lack knowledge, skills and resources.

Internet-delivered mindfulness for people with depression and chronic pain following spinal cord injury; a randomised, controlled feasibility trial

Dr Jasmine Hearn¹

¹*The University Of Buckingham, Buckingham, United Kingdom*

Rapid Fire - Miscellaneous Medical 3, Room C2.5, September 14, 2018, 13:45 - 15:15

Introduction: Populations with reduced sensory and motor function such as spinal cord injury are at increased risk of depression, anxiety, pain, and reduced quality of life (QoL), and may be less geographically mobile. This study explored the efficacy and feasibility of web-based mindfulness training for people with spinal cord injury (SCI).

Methods: This was a between-subjects, randomised controlled feasibility study of a UK community sample. Participants were randomly allocated to an eight-week online mindfulness intervention (N = 36), or to internet-delivered psychoeducation (N = 31). Depression symptom severity was the primary outcome. Secondary outcomes included anxiety, QoL, pain perception, pain catastrophising, and mindfulness. Measures were taken before (T1), at completion of, (T2), and three months following the intervention (T3).

Results: At T2, ten participants discontinued mindfulness training, and five had discontinued psychoeducation, with those discontinuing more likely to be older. Nine participants were lost to follow-up. Mindfulness reduced depression significantly more than psychoeducation at T2 (mean difference = -1.53, 95% CI [-2.43, -.63]) and T3 (mean difference = -2.74, 95% CI [-3.98, -1.50]). Anxiety, pain unpleasantness, and catastrophising also reduced to a significantly greater extent. Facets of mindfulness acting with awareness, non-reactivity to inner experience, describing, and total scores improved significantly more in mindfulness training. At follow-up, reductions in anxiety and catastrophising persisted compared to psychoeducation.

Conclusions: Internet-delivered mindfulness training offers unique benefits, and is viable for people with reduced sensory awareness. This study suggests that psychoeducation and mindfulness training may be combined for optimum benefit. The use of brief interventions shows promise in maximizing participant retention.

Experience of Robotic Exoskeleton Use at Four Spinal Cord Injury Model Systems Centers

Prof Allen Heinemann^{1,2}, Director Arun Jayaraman^{1,2}, Chaithanya Mummisetty¹, Jamal Spraggins¹, Assistant Prof Daniel Pinto⁸, Susan Charlifue⁶, Candy Tefertiller⁶, Assoc Prof Heather Taylor^{4,5}, Assistant Prof Shuo-Hsiu Chang^{4,5}, Dr Argyrios Stampas^{4,5}, Cathy Furbish³, Edelle Field-Fote^{3,7}

¹Shirley Ryan AbilityLab, Chicago, United States, ²Feinberg School of Medicine Northwestern University, Chicago, United States, ³Shepherd Center, Atlanta, United States, ⁴TIRR / Memorial Hermann, Houston, United States, ⁵University of Texas Health Science Center, Houston, United States, ⁶Craig Hospital, Englewood, United States, ⁷Emory University, Atlanta, United States, ⁸Marquette University, Milwaukee, United States

Rapid Fire - Living Well with SCI, Room C2.5, September 15, 2018, 08:00 - 08:55

Introduction: Refinement of robotic exoskeletons for overground walking is progressing rapidly. We describe clinicians' experiences, evaluations, and training strategies using robotic exoskeletons in spinal cord injury (SCI) rehabilitation and wellness settings; describe clinicians' perceptions of exoskeleton benefits and risks; and developments that would enhance utility.

Methods: We convened focus groups at four SCI Model System centers. A court reporter took verbatim notes and provided a transcript. Research staff used a thematic coding approach to summarize discussions.

Results: Thirty clinicians participated in focus groups. They reported using exoskeletons primarily in outpatient and wellness settings; one center used exoskeletons during inpatient rehabilitation. A typical episode of outpatient exoskeleton therapy is comprised of 20-30 sessions; at least 2 staff members are involved in each session. Treatment focuses on standing, stepping, and gait training; progress is measured with standardized assessments. Participants attributed physiological, psychological, and social benefits to exoskeleton use in addition to improved gait. Potential risks included falls, skin irritation, and disappointed expectations. Participants identified enhancements that would be of value including greater durability and adjustability, lighter weight, one-hand controls, ability to navigate stairs and uneven surfaces, and ability to balance without upper extremity support.

Conclusions: Each SCI Model System center had shared and distinct practices in terms of how they integrate robotic exoskeletons into physical therapy services. Clinicians deploy exoskeletons in different settings and use different clinical evaluations. Their experiences provide guidance to the integration of exoskeletons into inpatient and outpatient rehabilitation therapies, after care, and research directions.

Spinal cord injuries in low and middle income countries throw families into poverty: a cross-sectional study on a consecutive series of patients about to be discharged from a hospital in Bangladesh

A/prof Mohammad Sohrab Hossain^{1,2}, M.S. Islam¹, Md Akhlas Rahman¹, R.D. Herbert³, Mr Stephen Muldoon⁴, Prof Lisa Harvey²

¹Centre for the Rehabilitation of the Paralysed, Dhaka, Bangladesh. , ²Sydney University, Australia, Sydney, Australia,

³Neuroscience Research Australia, Sydney, Australia., ⁴Livability Ireland, Creevymore Cliffoney, Ireland

Rapid Fire - Delivery of SCI Care in Rural and Low-Resource Settings, Room C2.1, September 15, 2018, 08:00 - 08:55

Introduction: In Bangladesh, people with spinal cord injuries and their families face many problems. The purpose of this study was to determine the social situation and psychological status at the time of discharge from hospital of a large and representative sample of people from Bangladesh with recent spinal cord injuries.

Methods: Data were collected at the time of discharge on a consecutive series of 410 people with recent spinal cord injury who were wheelchair dependent and about to be discharged from a hospital in Bangladesh. The data collection was part of a 5-year clinical trial (the CIVIC trial) that is still underway. Participants were interviewed to determine their family, financial and work situations prior to injury as well as their quality of life (SF12) and rates of depression at discharge (Centre for Epidemiologic Studies Depression Scale (CESD-R)).

Results: 90% of participants were young men and 64% had no or limited ability to read. 72% of participants were the main income earners for their households prior to injury, earning an average of \$US110 per month (IQR, \$US60 to \$US180). In 50% of participants, this income was required to support 3 or more adults and 3 or more children. 13% and 42% of participants rated highly on the suicidal and sadness domains of the CEDS, respectively. The median (IQR) score for the Mental and Physical Components of the SF12 were 37 (35 to 40) and 43 (34 and 48), respectively.

Conclusions: Spinal cord injuries in low and middle income countries have profound implications for individuals and their families because those most often injured are young, poor, illiterate men. Most people with spinal cord injury who present to hospital are the main income earners for extended families, which are often large. Hence spinal cord injuries frequently throw families into poverty.

Challenges setting up a NZ Spinal Cord Injury Registry in New Zealand

Mrs Christine Howard-Brown¹, Ms Tracey Croot², Ms Leah Young³, Dr Raj Singhal⁴, Mr Daniel Rogers⁵

¹Phoenix Productions Ltd, Wellington, New Zealand, ²Canterbury District Health Board, Christchurch, New Zealand,

³Counties Manukau Health, Auckland, New Zealand, ⁴Canterbury District Health Board, Christchurch, New Zealand,

⁵Rick Hansen Institute, Vancouver, Canada

Rapid Fire - Systems of Care, Room C2.5, September 14, 2018, 08:35 - 09:30

Introduction:

The NZ Spinal Cord Impairment Action Plan (2014-2019) provided impetus to establish a long sought after New Zealand Spinal Cord Injury (SCI) Registry. Challenges associated with establishing the New Zealand Spinal Cord Injury Registry (NZSCIR) are presented.

Methods:

A pilot of two registry options preceded a successful business case for a NZ registry funded by the Accident Compensation Corporation (ACC) and two supra-regional spinal centres, in partnership with the Rick Hansen Institute, Canada. Representatives from the supra-regional spinal centres, the Ministry of Health, ACC, consumers and a research organisation formed an implementation governance group to establish the NZSCIR in partnership with the Rick Hansen Institute. The group worked through security, privacy and ethics requirements before developing a priori questions and developing protocols. Two registry coordinator roles were established and a staged implementation plan developed.

Results:

The NZSCIR was launched by the Minister of ACC, in collaboration with the Rick Hansen Institute, in August 2016. Challenges have related to differences between the two supra-regional services, refining the non-traumatic data set, incorporating data capture into current processes, changes of clinical and coordinator staff, increasing workload of the coordinators and data completeness. Consumer factors have included literacy and English as a second language, large questionnaires and whether to consent terminally ill consumers. Set-up of some registry and reporting elements, such as an interactive dashboard have taken more time than anticipated. Staged implementation of community and historic data collection should be completed in 2018.

Conclusions:

From a New Zealand perspective, NZSCIR data will enable measurement of outcomes to help determine whether people with SCI are living well. A partnership with the Rick Hansen Institute has enabled NZ to establish its own registry aligned with the Rick Hansen SCI Registry that will progress research, innovation and improvement for those with SCI.

The mortality rate among spinal cord injured women is higher than among spinal cord injured men

Dr, MD, PhD Claes Hultling¹

¹*Stiftelsen Spinalis, Solna, Sweden*

Rapid Fire - Miscellaneous Medical 1, Room C2.4, September 14, 2018, 08:35 - 09:30

Introduction:

Included in the actual study are all individuals in Sweden who sustained a SCI during 1997-2016 and were hospitalized for at least 30 days after their SCI. Excluded were persons that died within the first six months after injury. A total of 2,246 persons were included in the study, 1,620 with a traumatic SCI, 331 with a non-traumatic SCI, and in 295 the cause of SCI was unknown.

The data in our study was collected from two different registers held by the the Swedish National Board of Health and Welfare. The Causes of Death Register includes all persons who have deceased since 1961. The Patients Register is a nationwide register of all in-patient episodes – including diagnoses since 1987.

Results:

During the study period 254 (16%) of the men and 125 (20%) of the women have died. Considering age and time after injury women have a higher mortality than men. Among those injured before the age of 45, mortality is higher in individuals with tetrapares than with parapares. In women 15 years after the injury 13% of individuals with parapares and 18% of individuals with tetrapares have died. Among men the corresponding shares were 8% and 13%, respectively.

The cause of death varies and will be presented. Among the younger, suicide was one of the most common causes of death both in men and women – responsible of a quarter of the deceased. Pain was often found to be a trigger factor. Fatal tumor diseases were more common in younger women than in younger men.

Conclusions:

The incidence of SCI is lower in women but the mortality is higher. Suicide is an important cause of death in both younger men and women.

Activation of cervical networks via transcutaneous spinal cord stimulation promotes both immediate and long-lasting restoration of upper extremity function in chronic tetraplegia

MD., PhC Fatma Inanici¹, DPT. Soshi Samejima¹, PhD. Parag Gad², PhD. Reggie Edgerton², MD., PhD. Christoph P. Hofstetter¹, PhD. Chet T. Moritz¹

¹University of Washington, Seattle, United States, ²UCLA, Los Angeles, United States

Rapid Fire - Upper Extremity, Room C2.3, September 14, 2018, 08:35 - 09:30

Upper extremity (UE) function is the highest priority of tetraplegics for improving quality of life. The objectives of this study are (1) to determine therapeutic potential of transcutaneous electrical spinal cord stimulation for restoration of UE function and (2) to test the hypothesis that stimulation of cervical networks can facilitate neuroplasticity, which results in long-lasting improvement in motor control. A 62-year-old male with C3 incomplete injury two years prior participated in the study. The intervention comprised alternating phases of (1) transcutaneous spinal cord stimulation combined with physical and occupational therapy (PT/OT), (2) identical PT/OT only, and (3) a brief combination of stimulation and PT/OT once again. For electrical stimulation, we used biphasic, rectangular, 1 ms pulses at a frequency of 30 Hz, filled with a carrier frequency of 10 kHz, which permitted high stimulation intensities to be delivered to the cervical spinal cord over the skin without discomfort. The Graded Redefined Assessment of Strength, Sensation and Prehension (GRASSP) test, pinch strength measurement and International Society for Neurologic Classification of Spinal Cord Injury (ISNCSCI) assessment were performed throughout baseline, interventions and follow-up. Following 4-weeks of combined stimulation and motor training, all outcome measurements improved remarkably. Improvement in total GRASSP score was 49 points and in UE motor score of ISNCSCI was 10 points. Left and right hand pinch strengths increased 2- to 7-fold, respectively. Normal pinprick and light touch sensations returned to the chest dermatomes. Neurologic level of injury improved from C3 to C4. The magnitude of the immediate improvements far exceeded the previous reports of UE rehabilitation in the chronic stage of spinal cord injury. Most notably, functional gains persisted for over 3-month follow-up without further treatment. These data suggest that non-invasive electrical stimulation of spinal networks can promote substantial plasticity and long-term recovery following spinal cord injury.

Modifiable and non-modifiable risk indicators for length of hospital stay following acute TSCI in an under-resourced setting

Dr Conran Joseph^{1,2}, Dr David Conradsson^{2,3}, Prof Lena Nilsson Wikmar², Prof Julie Phillips¹

¹University of The Western Cape, Cape Town, South Africa, ²Karolinska Institutet, Stockholm, Sweden, ³Karolinska University Hospital, Stockholm, Sweden

Rapid Fire - Systems of Care, Room C2.5, September 14, 2018, 08:35 - 09:30

Introduction: The incidence of traumatic spinal cord injury (TSCI) appears to be higher in developing countries, such as South Africa, leading to a greater demand on state health care resources. As pointed out in operative clinical practice guidelines for SCI, the timing and nature of acute care processes is paramount for survival and optimal recovery. Providing access to these services in a time-sensitive manner is necessary. This study aimed to determine modifiable and non-modifiable risk indicators for acute length of hospital stay (LOHS) in order to widen access to more people when needed.

Methods: A prospective, population-based cohort design was implemented. All newly-injured survivors of TSCI were included for a one-year period, and all basic core data, as well as processes of care and secondary medical complications information, were consistently collected. The cut-point for adequate and prolonged acute LOHS was set at <31 and >31 days, respectively. Univariate logistic regression analysis was performed to identify risk indicators.

Results: The total sample consisted of 145 individuals, of which 139 had valid LOHS data. The average and median acute LOHS were 30.5 and 24 days, respectively. According to the cut-point chosen, 61% of participants were in hospital for 31 days or less. Significant non-modifiable risk indicators were males (OR=3.85; p=0.04), complete spinal cord injuries (OR=3.70; p<0.001), and vertebral fractures (OR=5.21; p<0.001). Modifiable risk indicators were those who developed pressure ulcers (OR=11.86; p<0.001), pulmonary complications (OR=6.89; p<0.001), neuropathic pain (OR=6.06; p=0.03), urinary tract infections (OR=2.55; p=0.04), and those with a delayed spinal surgery (OR=2.27; p=0.02).

Conclusions: Both modifiable and nonmodifiable risk indicators influencing LOHS were identified. Particular attention should be focused on preventable complications with aim of optimizing recovery but also widening access to people in need of acute care.

Processes and outcomes of acute care: towards strengthening health systems for acute survivors of traumatic spinal cord injury in South Africa

Dr Conran Joseph^{1,2}, Prof Julie Phillips¹, Prof Lena Nilsson Wikmar²

¹University Of The Western Cape, Cape Town, South Africa, ²Karolinska Institutet, Stockholm, Sweden

Rapid Fire - Delivery of SCI Care in Rural and Low-Resource Settings, Room C2.1, September 15, 2018, 08:00 - 08:55

Introduction: A specialist systems approach had been advocated for the management of spinal cord injuries (SCI's); however the adopted of such an approach is rather slow in developing contexts. The objective of this study was to provide an evidence-based foundation for strengthening health systems by investigating selected processes affecting outcomes in two international contexts – Sweden following a systems and South Africa a general (non-systems) approach.

Methods: This study included all acutely-injured individuals with ASIA Impairment Scale A-D, surviving seven days, for a one-year period. The cohort sizes were 145 and 45 for South Africa and Sweden, respectively. Process of care variables included transfer (time) to a specialised unit, whether spinal surgery was performed, time to spinal surgery, length of hospital stay, and referral for rehabilitation. Outcomes of care included in-hospital mortality, neurological recovery and secondary medical complications. Inferential statistics were used.

Results: In South Africa, more persons had intermediate admissions ($p < 0.01$) prior to being admitted to a specialised acute unit, fewer with vertebral injuries received spinal surgery ($P < 0.001$), and spinal surgeries were significantly delayed ($P < 0.001$), compared with Sweden. Concerning outcomes, more in-hospital deaths were observed in South Africa, 10 out of 145, compared with only one in Sweden. Significantly more secondary complications occurred in South Africa, especially pressure ulcers ($p < 0.001$).

Conclusion: Recommended processes affecting health outcomes differ between contexts. The evidence derived from this prospective, population-based study could be used for the promotion of systems of care.

SCI related sublaesional osteoporosis - the guidelines of the German speaking medical society of paraplegia (DMGP)

Dr Yorck Kalke¹, Dr Juergen Moosburger², Dr Angela Frotzler³

¹SCI Centre Ulm University, Ulm, Germany, ²SCI Centre Heinrich-Sommer-Klinik, Bad Wildbad, Germany, ³Swiss Paraplegic Centre Nottwil, Nottwil, Switzerland

Rapid Fire - Miscellaneous Medical 1, Room C2.4, September 14, 2018, 08:35 - 09:30

Introduction: The DMGP (German speaking Medical Society for Paraplegia) founded a specialized working group for "SCI and Osteoporosis".

Methods: The S1-guideline "SCI related osteoporosis" was worked out based on the DVO-guideline "Prevention, diagnostics and therapy of osteoporosis in men over 60 and in postmenopausal women" and was listed at the AWMF who represents Germany in the Council for International Organizations of Medical Sciences CIOMS.

Results: There are multiple reasons for SCI related osteoporosis additional to the pure mechanical relief. The loss of bone mineral density can be measured within the first months after SCI. Osteoporosis related fractures can be found typically in the region of the distal femur and the proximal tibia without adequate trauma. Bisphosphonates seem to reduce the bone resorption and functional electric stimulation seems to have a positive influence on the bone density in this special patient group. Osteodensitometry with DXA for lumbar spine and hip region should be performed within 12 weeks after SCI, further control examinations in a scheduled time frame only on one hip side. Basic medication with calcium and vitamin D3 will be recommended for a t-score up to -2.0, additional use of bisphosphonates or osteoanabolic medication for a t-score of <-2.0. This therapy should be given for the duration of at least 3 years as long as the t-score is <-2.0.

Conclusion: So far there are not high level evidenced based recommendations for prevention and therapy of osteoporosis in individuals with SCI to minimize the risk of fracture incidence. This DMGP S1-guideline will be helpful for orientation. For further information: www.dmgp.de

Successful Strategies for Activity and Wellness after Spinal Cord Injury

Dr Jenny Kiratli¹, Dr Brinda Dalal¹, Dr Jeffrey Jaramillo¹, Ramya Gopalan¹, Jessica Greene¹

¹VA Palo Alto Health Care System, Palo Alto, United States

Rapid Fire - Miscellaneous Medical 3, Room C2.5, September 14, 2018, 13:45 - 15:15

Introduction:

The objective of the research was to explore and identify strategies used by persons with SCI to overcome personal, physical, and societal barriers to achieve an active lifestyle. Lifelong health and quality of life require skills, behaviors, and routines outside the clinical setting and post-rehabilitation.

Methods:

We conducted a mixed method, qualitative study which included focus groups and semi-structured interviews with persons with SCI, caregivers/family, community-based supporters, and clinical staff. Our sample included 37 individuals with SCI (70% male, 54% tetraplegia/46% paraplegia, even distribution younger and older than 50 years, and even distribution of Veterans and non-Veterans) and 24 clinicians, caregivers, coaches, and support personnel. Assessments were made of physical activity and psychosocial status using standard scales.

Results:

The following major themes emerged:

1. Broad definition of “active” – consumer definitions encompassed physical, social, and mental aspects of being active rather than only exercise/recreation.
2. Social support for community integration – two phases were identified. During the initial post injury phase at home, the important of family and friends offering emotional support and helping adapt the physical environment were critical. During the second phase, importance shifted to friends and acquaintances who helped navigate retraining and/or finding jobs.
3. Importance of exercising at home – many individuals expressed the importance of adapting therapeutic regimens and had discovered creative ways to exercise using a range of objects and devices.
4. Pursuit of high intensity workouts as a way to help regain function – many individuals expressed the perception that programs outside traditional therapy had benefited them physically and mentally. Measured fitness and physical function tests were not strongly associated with activity or satisfaction with life.

Conclusions:

Incorporating perspectives of consumers is essential for patient-centered care. Awareness of expressed factors that contribute to successful reintegration can be applied in the clinical setting.

Development of the Guidance on the support needs of adults with spinal cord injury

Dr Sue Lukersmith^{1,2}, **Mr Tony Jones**³, Ms Margot Lilley⁴, Mr Jeff Tonge¹

¹icare NSW, Sydney, Australia, ²University of Sydney,, Sydney, Australia, ³Spinal Cord Injuries Australia, Sydney, Australia,

⁴Occupational Therapy Australia, Melbourne, Australia

Rapid Fire - Systems of Care, Room C2.5, September 14, 2018, 08:35 - 09:30

Introduction

We all need assistance and support with our day-to-day activities and life roles whether it is at home, when studying or training, at work or for social and community activities. Yet, there are many factors to consider when making decisions on the need for support of the person with spinal cord injury (SCI). The research project was a major revision of the previous 2007 Guidelines for levels of attendant care for people with SCI.

Methods

The guidance used adapted guideline methodology given the complexity of the topic. The research involved seven steps using mixed methods and thereby multiple sources of knowledge. There was: a systematic literature search of peer-reviewed published and grey literature; on-line stakeholder survey; analysis of data on support workers provided to people with SCI; international frameworks and trends to inform the structure of the guidance; working party of experts (practice and lived experience); stakeholder feedback and peer review of the draft guidance.

Results

The guidance methods resulted in the development of a decision-making framework, overview of the factors to consider, information and resources and definitions of key components for a common language. For the different levels of spinal cord injury there are tables on estimates for the levels of support, lists of assistive technology and other practical matters to consider plus resources such as screening tools, and an information sheet for the person and their family.

Conclusions

The guidance draws on the limited research available but uses mixed methods to access rich first-hand expert practical and contextual knowledge. The guidance articulates a best practice person-centred (whole person) approach and highlights the need to understand, and gain information from and about the person, their context and progress to match the need with supports.

Increasing patient access to maintenance of bowel care regimens: improving clinician's knowledge, competence and confidence.

Mrs Yvette Mair¹, Mrs Sonia Jones²

¹Royal North Shore Hospital, St Leonards, Australia, ²Royal North Shore Hospital, St Leonards, Australia

Rapid Fire - Bowel and Bladder, Room C2.4, September 14, 2018, 13:45 - 15:15

Introduction

Bowel dysfunction after spinal cord injury (SCI) has negative health related effects on quality of life. Optimising bowel management requires individualised regimens, including digital rectal examination (DRE), digital stimulation (DS) and digital removal of stools (DRS). Initiation and maintenance of bowel regimens for patients with SCI, being cared for on non-spinal specialist units within our hospital, was suboptimal. Other care facilities were identified as having policies prohibiting DS and DRS. Non-adherence to individualised regimens leads to complications including diarrhoea, constipation, anxiety and loss of dignity. The aim of this workshop was to improve clinician's competence and confidence to perform bowel management for SCI patients, in non-spinal units.

Methods

Thirteen registered nurses attended a day workshop incorporating theoretical and practical components of neurogenic bowel management. Simulation mannequins were used to enhance participants' DRE learning experience. Three forms of evaluation were performed; before and after knowledge assessment, a Likert confidence rating scale and workshop evaluation.

Results

Participants' knowledge doubled as a result of the workshop; 36 % correctly answered questions before versus 72% after. Before the workshop only 24% were confident or very confident in performing a neurogenic bowel assessment, DRE, DS, DRS and managing incontinence and autonomic dysreflexia. Whereas 75-92%, were confident, or very confident with these skills afterwards. Content was highly rated as relevant by 90% of participants, 96% highly rated presentation and delivery. Simulation exercises were highly rated by 94% of participants.

Conclusions

Theoretical education, combined with simulated practice, had a positive effect on knowledge and confidence in performing invasive neurogenic bowel management. This ensures improved outcomes for SCI patients including decreased disruption to regimens, fewer complications and improved emotional wellbeing. This workshop will be presented bi-annually. We aim to capture clinicians outside of this hospital, including private hospitals, community providers and those in rural settings.

Delayed Supinator Nerve to Posterior Interosseous Nerve Transfers in Patients with Tetraplegia

Mr Stephen Flood¹, Dr George Miller¹, Dr Geoff Lee¹, Ms Catherine Cooper¹, Mr Michael Weymouth¹, Dr Natasha Van Zyl¹

¹*Victorian Spinal Cord Service, Austin Health, Heidelberg, Australia*

Rapid Fire - Upper Extremity, Room C2.3, September 14, 2018, 08:35 - 09:30

Introduction:

The utility of the supinator nerve to posterior interosseous nerve (PIN) transfer in order to restore active hand opening in tetraplegia has previously been described but it is generally recommended to have this surgery within the first 18 months post SCI. This study aims to show outcomes of patients who have undergone supinator to PIN nerve transfers more than 2 years after their injury.

Methods:

We performed a retrospective review of all patients who underwent supinator to PIN transfer at a single centre. Patients who had a delay from injury to surgery greater than 2 years were included for evaluation. All patients received specialist rehabilitation. Clinical outcomes measured included muscle strength testing, measurement of first webspace opening, Action Research Arm Test (ARAT), and Grasp and Release Test (GRT) Canadian Occupation Performance Measure (COPM) and patient satisfaction scores.

Results:

Eight patients, with a mean age of 36 years, and an AIS C5-C6 motor complete SCI underwent supinator nerve to PIN transfer. The mean delay from injury to surgery was 107 months (range 32-306 months). The mean post-operative follow-up was 13 months (range 5 - 29 months). One patient was lost to follow up. The mean Medical Research Council (MRC) grade for power of thumb extension was 2.4, and mean finger extension also 2.4. The mean first web space opening was 6.8cm. Outcomes are demonstrated with video recordings of patient functional abilities. Three patients are yet to complete twelve months recovery since surgery.

Conclusions:

The supinator to PIN transfer provides an option for restoring upper limb function in C5/6 cervical SCI. In the delayed setting more than 2 years following injury the transfer can still provide some benefit in selected patients and has a promising rate of success. We describe factors associated with good and poor outcomes from our institution.

Evaluation of the effectiveness of ambulatory training with an exoskeleton in ambulatory persons with acute incomplete SCI.

Dr Ilaria Baroncini¹, Dr Enrica Bonatti¹, Ft Claudio Nalon¹, Dr Giulia Giovannini², Dr Silvia Volini¹, Dr Manuela Marani¹, Dr Tiziana Giovannini¹, Dr Jacopo Bonavita¹, Dr Gaia Musumeci¹

¹Montecatone Rehabilitation Institute, Imola, Italy, ²Department of Statistics, University of Bologna, Italy

Rapid Fire - Functional Outcomes, Room C2.3, September 15, 2018, 08:00 - 08:55

EKSO-GT™ exoskeleton was introduced in our Institute as a therapeutic tool in the context of locomotive training.

An observational study was conducted to describe the responses to this training in patients with motor incomplete SCI (AIS C or D) in the acute phase for the purpose of achieving functional walking.

A subpopulation of 24 subjects was analyzed, who at the beginning of treatment were already able to ambulate. The primary objective was the description of the functional responses to training with specific tests objectifying kinetic and endurance characteristics of locomotion (10MWT and 6MWT) at fixed times (T0 beginning of training and T2 after 18 sessions) with and without exoskeleton.

The characteristics of the sample were: age 20-70; 62.5% males; 58.3% traumatic etiology of the lesion. The median of the interval between the lesion event and the beginning of treatment was 93 days.

The 10MWT performance with and without exoskeleton significantly improved between T0 and T2 in terms of time (p-value < 0.005).

The 6MWT performance with or without exoskeleton significantly improved between T0 and T2 in terms of meters covered (p-value <0.005).

The median of the number of meters covered without exoskeleton is much higher than with exoskeleton both at T0 and at T2.

From the results obtained we can also conclude that this treatment, proposed early within a conventional rehabilitation pathway, can facilitate the locomotor recovery of incomplete SCI subjects, both in terms of endurance and speed. Our data seem to indicate that performance with exoskeleton at the end of the training may be more difficult than without it, due to the greater complexity of control and adaptation to the device.

We can therefore hypothesize that the early use of Ekso in patients with an expectation of functional walking allows a rapid achievement of the autonomous walking.

Diaphragm Pacing Leads to Improved Airway Management in Spinal Cord Injury- Decreasing the Need for Tracheostomies thereby decreasing Morbidity

Dr Raymond Onders¹, MaryJo Elmo¹

¹University Hospitals Case Medical Center, Cleveland, United States

Rapid Fire - Miscellaneous Medical 2, Room C2.3, September 14, 2018, 13:45 - 15:15

Objective: The National Trauma Data Bank reports tracheostomy rate for cervical injuries to be over 30%. The benefits of tracheostomy are documented however they do have risks and in chronic long term use, there is sub optimal management. This is a report of tracheostomy use in all traumatic SCI patients who underwent diaphragm pacing(DP).

Methods: This is a retrospective review of prospective IRB and or FDA approved protocols involving SCI and DP. Airway management of traumatic SCI who underwent DP was analyzed pre and post DP implant.

Results: Out of almost 500 implanted DP patients 92 were traumatic SCI with complete tracheostomy data on 84 patients. Fifty nine or 63% of patients had a cuffed tracheostomy at the time of DP evaluation.

Average age at time of injury was 27. 8 years(1 day to 74 years). The average time spent on mechanical ventilation prior to DP was 9.7 years(6 days to 25.6 years). Within this group are 13 pediatric patients age 0 to 17 in which 54% presented with a cuffed tracheostomy tube. Post DP implant, 7 patients were decannulated, 15 patients had tracheostomy converted to cuffless tube and 2 patients went to a stoma stent. One patient required laryngectomy due to tracheal damage. Two patients went directly from Endotracheal tube MV to DP to extubation avoiding tracheostomy altogether.

Conclusions: The efficacy and benefits of the cuffless tracheotomy was first described in 1990. Publications in SCI and chronic mechanical ventilation describe the use of cuffless tracheotomy but this report confirms cuffed tube usage is dominant except in pediatrics where usage is statistically lower. The choice of tracheostomy style needs to be better scrutinized. DP implantation allowed for downsizing and decannulation. It obviated the need for tracheostomy in two patients. Early DP use may significantly alter the morbidity of tracheostomies.

Can we predict the severity of spinal cord damage at an early stage?
-for the introduction of neuroprotection against the secondary damage of spinal cord injury-

MD Masahiro Ozaki^{1,2}, MD Kota Suda¹, MD Tsunehiko Konomi³, MD Satoko Matsumoto¹, MD Miki Komatsu¹, MD Yuichiro Hisada¹, MD Kentaro Haraya¹, MD Akio Minami¹
¹Hokkaido Spinal Cord Injury Center, Bibai, Japan, ²Keiyu Orthopedic Hospital, Tatebayashi, Japan, ³NHO Murayama Medical Center, Musashimurayama, Japan

Rapid Fire - Miscellaneous Medical 1, Room C2.4, September 14, 2018, 08:35 - 09:30

【Introduction】

Secondary damage following spinal cord injury (SCI) cause large deficit around the lesion site and make it difficult to regenerate injured spinal cord. Therefore, it is indispensable to prevent secondary damage by all possible means. The purpose of this study is to identify factors that contribute to the progression of secondary damage of spinal cord using general blood test and MRI.

【Methods】

Seventy-one acute SCI patients who were admitted within 24 hours after injury at our institution between 2011 and 2015 and diagnosed as Frankel A or B at admission were enrolled in this study. Two spinal surgeons assessed intensity changes of the spinal cord with MRI. The patients were retrospectively divided into progressive (P) or non-progressive (NP) group according to change of high intensity area in spinal cord between at admission and 4 weeks after injury. We evaluated the correlation between intensity change in MRI and the data of blood test within 4 weeks after injury using multivariate logistic regression analysis.

【Results】

Sixteen patients (22.5%) were categorized as P group and 55 (77.5%) as NP group. In the univariate analysis, white blood cell count at 3 days after injury ($P = 0.021$) and CRP at 3 ($P = 0.014$) and 7 ($P = 0.047$) days after injury were significant risk factors of the progression of high intensity area in spinal cord. The multivariate logistic regression analysis identified CRP at 3 days after injury as a significant independent risk factor (OR: 1.138, 95%CI: 1.010-1.282).

【Conclusions】

The current study revealed that patients with high level of serum CRP at 3 days after injury suffer more severe secondary damage. Neuroprotection and anti-inflammatory intervention at acute stage should be positively considered for SCI patients with high level of serum CRP at 3 days after injury.

From “I am” to “I can:” Exploring the Dynamic Pathway of Quality of Life after Spinal Cord Injury: An Indian Perspective

Dr Divya Parashar¹

¹*Indian Spinal Injuries Centre, New Delhi, India*

Rapid Fire - Delivery of SCI Care in Rural and Low-Resource Settings, Room C2.1, September 15, 2018, 08:00 - 08:55

Quality of life (QoL), in developed countries, has gained significance as a key rehabilitation goal after spinal cord injury (SCI). However, it is an under-explored concept in developing countries like India. This study aimed to gain an insight of how consumers with SCI perceived quality of life in India. Specific questions the study aimed to answer were: (i) What contributes towards attaining optimum QoL for the participants? (ii) Does the definition of QoL change as time elapses after an SCI? (iii) What is the participants' self-rating on the International SCI Data Set for QoL?

In-depth, semi-structured personal interviews were conducted with 50 consumers with SCI at five different intervals from time of admission to 5 years with the aim of gaining extensive knowledge into their perceptions of the injury, and their perceived QoL. The SCI Data Set for QoL was administered to the participants.

Consumers focused on physical, psychological, socio-cultural, economic, environmental, and experiential/phenomenological domains as they attempted to classify the determinants of QoL. A shift in the definition of QoL pre-and post-injury was noted with QoL assuming a multi-dimensional nature, in addition to a strong correlation being found between appraisals of disability and QoL. Themes in achievements and evaluations over time were delineated: exploring options for a recovery, refocused values, a pursuit of autonomy, exploited limited possibilities, and attempted a life with quality.

Clinical implications of the study focused on the need to provide comprehensive biopsychosocial rehabilitation with a focus on education and management of the injury and health implications at the outset; the crucial role of peer mentors; vocational opportunities, training & retraining; and community based rehabilitation to provide continuity of care

Prediction of Functional Improvement after Spinal Cord Injury Rehabilitation in Thailand: Results from Thai Spinal Cord Injury Registry

Dr Sintip Pattanakuhar¹, Dr Napasakorn Komaratat², Dr Rungarun Mahachai³, Dr Chayaporn Chotiyarnwong⁴, Dr Pratchayapon Kammuang-lue¹, Dr Apichana Kovindha¹

¹Department of Rehabilitation Medicine, Faculty of Medicine, Chiang Mai University, Chiang Mai, Thailand, ²Sirindhorn National Medical Rehabilitation Institute, Bangkok, Thailand, ³Department of Rehabilitation Medicine, Ratchaburi Hospital, Ratchaburi, Thailand, ⁴Department of Rehabilitation Medicine, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand

Rapid Fire - Functional Outcomes, Room C2.3, September 15, 2018, 08:00 - 08:55

Objective: To predict functional improvement of newly admitted patients with spinal cord injury (SCI) in Thailand.

Study design: Prospective cohort study

Setting: Four rehabilitation facilities in Thailand, one is a SCI-specialized center (SSRC), and the others are non SCI-specialized rehabilitation center

Methods: Data were extracted from the Thai SCI Registry. Multivariate regression analysis was used to analyze associated factors predicting the functional outcome measured with Spinal Cord Independence Measure (SCIM) at discharge.

Results: Among 236 new SCI in-patients enrolled in the Thai SCI Registry, 167 persons (71%) were admitted in SCI-specialized Rehabilitation Center. SSRC had more proportion of non-motor functioning tetraplegic (AIS A, B or C) and motor-functioning (AIS D) patients, while non SSRC had more proportion of paraplegic patients. However, no significant difference of SCIM score at admission was found. By using multivariate regression analysis, age (negative factor), SCIM at admission (positive factor), level of injury (positive factor) and being admitted at the SSRC were the independent predictive factors of SCIM at discharge. The formula, which $R^2 = 0.577$, is that $SCIM \text{ at discharge} = 7.006 - 0.171(\text{age}) + 13.101(\text{level of injury}) + 0.696(\text{SCIM at admission}) + 5.605(\text{being admitted at SSRC})$. While: Level of injury: tetraplegia AIS A, B, C = 1; paraplegia AIS A, B, C = 2; tetraplegia AIS D = 3; and SSRC: Yes = 1; No = 0

Conclusion: Age, SCIM at admission, level of injury and being admitted in SSRC is the independent predictive factor of functional dependence level at discharge.

The influence of level of spinal cord injury on left ventricular structure and contractile function

Dr Malihe-Sadat Poormasjedi-Meibod^{1,2}, Mr Brian Hayes^{1,2}, Miss Mary Fossey^{1,2}, Miss Erin Erskine¹, Mrs Diana Hunter¹, Dr Christopher West^{1,2}

¹*International Collaboration on Repair Discoveries (ICORD), Faculty of Medicine, University of British Columbia, Vancouver, Canada,* ²*School of Kinesiology, University of British Columbia, Vancouver, Canada*

Rapid Fire - Miscellaneous Medical 2, Room C2.3, September 14, 2018, 13:45 - 15:15

Introduction

Spinal cord injury (SCI) has been shown to cause cardiac atrophy and impaired cardiovascular function. These changes are thought to be level-dependent, whereby individuals with cervical SCI have the greatest degree of dysfunction. However, our understanding of the relationship between the level of injury and left ventricular (LV) remodeling is limited, which hinders our ability to develop effective preventive/therapeutic interventions.

Design/Method

To examine the level-dependency of LV structural remodeling and contractile dysfunction post-SCI, 18 male Wistar rats were subjected to complete SCI at the 3rd thoracic segment (T3-SCI; impaired descending sympathetic control) or the 2nd lumbar segment (L2-SCI; intact descending sympathetic control). Uninjured rats were used as controls (CON). Twelve weeks post-injury, cardiac function was examined in vivo using echocardiography and direct LV catheterization with a pressure-volume conductance catheter, and cardiac tissue was collected for further analyses.

Results:

Compared to CON and L2-SCI, T3-SCI exhibited a significant reduction in mean arterial pressure (CON:82.2±9.9, T3-SCI:52.4±6.2, and L2-SCI:89.58±21.6mmHg; P<0.009), LV stroke work (CON:22.5±7.6, T3-SCI:8.9±2.7, and L2-SCI:21.4±6.3mmHg/mL; P<0.016), and contractility (i.e., dP/dtmax and dP/dtmin). T3-SCI also exhibited a reduction in end-systolic elastance (i.e., intrinsic load-independent contractile function) vs. L2-SCI and Con (CON:1.27±0.15, T3-SCI:1.01±0.13, and L2-SCI:1.44±0.37; P<0.034). Histological analysis indicated a significant decrease in cardiomyocyte length in T3-SCI vs. CON (CON:88.38±5.45 and T3-SCI:82.11±5.96µm; P<0.027). Gene and protein expression analysis demonstrated an upregulation of the two main intracellular proteolytic pathways (i.e., the ubiquitin-proteasome system and autophagy) in T3-SCI only.

Conclusion:

High-thoracic, but not lumbar, SCI is associated with systolic dysfunction and cardiomyocyte atrophy, which occur in concert with upregulation of UPS and autophagy. These findings indicate that descending sympathetic control is critical for maintaining normal cardiac structure and function.

Problems accessing help with bowel care following spinal cord injury: a qualitative study

Assoc Prof Julie Pryor^{1,2}, Assoc Prof Murray Fisher^{2,1}, Dr Denise Haylen¹, Dr Grace Leong¹

¹Royal Rehab, Ryde, Australia, ²The University of Sydney, Sydney, Australia

Rapid Fire - Miscellaneous Medical 3, Room C2.5, September 14, 2018, 13:45 - 15:15

Background and aim

Bowel dysfunction has the greatest impact on quality of life for people with spinal cord injury (SCI). This study aims to explore the nature of problems experienced by people with SCI when accessing help to maintain recommended bowel care regimes outside specialist spinal injury services.

Method

A descriptive, mixed methods study conducted in NSW. Clinicians working in specialist spinal injury services completed an online survey about issues that people with SCI had reported to them about accessing help to perform bowel care. People with SCI participated in interviews to tell of their experiences of problems accessing help with bowel care. The data comprised 24 stories from clinicians and interviews with 11 people with SCI. The data were analyzed using thematic analysis.

Results

People with SCI experience problems accessing help in community and aged care settings, but mostly when hospital inpatients where their needs do not fit with the pace and processes of the acute hospital environment. People with SCI experience significant repercussions as a result of these problems, including bowel accidents, incomplete bowel emptying or constipation and autonomic dysreflexia, as well as new injuries such as skin injuries and anal sphincter damage. In addition to embarrassment and stigma they suffer uncertainty, fear, worry, distress, feeling unsafe, anger and feeling down. Vignettes from personal stories will be used to illustrate the results.

Conclusion

There appears to be widespread failure of the system to meet the bowel care needs of people with SCI. Rather than restoring their health, being admitted to hospital can represent a significant health risk for these people. Policy and practice need to be more person-centred to better address complex individual needs.

Educational provision for patients following a spinal cord injury; a service evaluation

Mrs Sian Rodger¹

¹*The London Spinal Cord Injury Centre, Stanmore, United Kingdom*

Rapid Fire - Systems of Care, Room C2.5, September 14, 2018, 08:35 - 09:30

Background and rationale

A vital element of rehabilitation is the provision of formal and informal education. Patient education optimises patients' involvement in their own decision making and care aiming to promote adherence to agreed plans, reduce post injury complications, promote independence, participation and improved quality of life.

Design and Methods

A questionnaire survey collected data from a purposive convenience sample of 90 in patients, out patients (up to 2 years post injury) and healthcare staff actively involved in the rehabilitation of people with a SCI at The London Spinal Cord Injury Centre (LSCIC), . Data were collected between September-November 2017. Participants completed a locally designed paper or online questionnaire, which included Likert style questions and opportunity for free text comments. Different education resources (book, 1:1 and group sessions) were evaluated.

Results

98% of healthcare staff found giving education an enjoyable part of their role with most agreeing (45/48) it is the responsibility of all healthcare staff. Barriers to giving education were identified such as time and inadequate staffing, as were themes that healthcare staff considered important when giving education such as communication and barriers to learning.

The formal education programme was valued by both inpatients and outpatients, sessions were graded to inform future programme.

Face to face education sessions was the preferred delivery method for 80% of outpatients and inpatients followed by an App/online e learning.

65% of outpatients said they had used their education pack post discharge.

More detailed results of education topics and feedback will be presented.

Conclusions and recommendations

Findings will inform development of the local education programme, with a particular focus on reducing post discharge complications and development of an App designed for this patient group.

Central cord syndrome (CCS) is not a favourable cervical spinal cord lesion

Dr Giorgio Scivoletto¹, Dr Monica Torre¹, Dr Doris Maier², Dr Norbert Weidner³, Dr Martin Schubert⁴, Dr Rudiger Rupp³, Dr Abel Rainer⁵, Dr Kalke York⁶, Dr Kritz Jiri⁷, Prof Armin Curt⁴, Dr Marco Molinari¹
¹*Irccs Fondazione S. Lucia, Roma, Italy*, ²*Berufsgenossenschaftliche Unfallklinik Murnau, Murnau, Germany*, ³*Spinal Cord Injury Center, Heidelberg University Hospital, Heidelberg, Germany*, ⁴*Neurology, Spinal Cord Injury Center, University of Zürich, Balgrist University Hospital, Zürich, Switzerland*, ⁵*Spinal Cord Injury Center, Hohe Warte, Bayreuth, Germany*, ⁶*SCI Centre Orthopaedic Department Ulm University, Ulm, Germany*, ⁷*Spinal Unit, Motol Hospital, Prague, Czech Republic*

Rapid Fire - Living Well with SCI, Room C2.5, September 15, 2018, 08:00 - 08:55

Background: CCS is reported to have better outcome than other kinds of cervical lesions, especially with regard to ambulation and bladder recovery. However, our clinical experience made us think that this is not true and that in reality CCS globally has a worse outcome than incomplete tetraplegia (TI).

Objective: Aim of the study is to investigate the neurological and functional outcomes CCS patients in comparison to TI ones.

Methods: From the European Multicenter Study about Spinal Cord Injury database we derived the data of patients with traumatic incomplete tetraplegia. CCS were diagnosed based on a difference of at least 10 points of power in favor of the lower extremities. Patients were evaluated at 30 days, 6 months and 1 year from injury. The ISNCSCI neurological data and functional data according to the SCIM were collected at each time point. Walking was evaluated by WISCI, 10MWT and 6MWT. Patients were selected from the database with a matching procedure based on lesion severity, neurological level of injury and age.

Outcomes evaluation was performed by means of Student's T test for dependent samples.

Results: The matching produced 110 comparable dyads. At all timepoints UEMS remain lower and LEMS higher in CCS than TI. SCIM subscores "Respiration and sphincter Management" and "Mobility" are comparable in the two groups, while "Self-Care" one is always significantly lower in CCS subjects than TI ones

Conclusions: contrarily to what reported previously, CCS does not seem to represent a good prognostic factor for patients with incomplete cervical lesions.

Applying the RE-AIM framework to evaluate Canadian spinal cord injury peer mentoring programs

Mr Robert Shaw¹, Dr Shane N Sweet², Mr Bill Adair³, Dr Chris McBride⁴, Dr Kathleen Martin Ginis¹

¹University of British Columbia, Kelowna, Canada, ²McGill University, Montreal, Canada, ³Spinal Cord Injury Canada, Toronto, Canada, ⁴Spinal Cord Injury British Columbia, Vancouver, Canada

Rapid Fire - Delivery of SCI Care in Rural and Low-Resource Settings, Room C2.1, September 15, 2018, 08:00 - 08:55

Introduction: Spinal cord injury (SCI) peer mentors are individuals who have successfully faced challenges of living with a SCI, and who share their experiences in order to help others adapt and thrive. Benefits for individuals who receive mentorship include improvements in motivation, self-efficacy, and participation. Despite the known individual-level benefits of SCI peer mentoring, little is known about the reach and impact of peer mentoring programs at the organizational level. This study utilized the RE-AIM framework (Glasgow, Vogt, & Boles. 1999) to examine the Reach, Effectiveness, Adoption, Implementation, and Maintenance of SCI peer mentoring programs offered by organizations belonging to SCI Canada's National Federation.

Methods: Seven provincial organizations who serve people with SCI as their main clientele were recruited. Organizations completed a one-time survey examining different elements of the peer mentoring programs they offer. Measures of all five RE-AIM dimensions were included in the survey. Data were analyzed using summary statistics to describe peer mentorship programs at both the individual and organizational level.

Results: For the 2016/17 fiscal year, participating organizations reached 1.1% of people living with SCI in their home provinces and 0.82% of the entire Canadian SCI population. The majority (57%) of organizations tracked the effectiveness of their peer programming through testimonials, and reports. Adoption rates were high with 100% of organizations offering peer mentoring services both in community and hospital settings.

Organizations allocated 7.9% of their total operating budget (range=0-42%) and 7.8% of their staff to implement peer mentoring services and 85.7% have maintained their programming for over 10 years.

Conclusions: Despite high adoption and maintenance rates, the individual level reach and effectiveness tracking of peer mentoring programs appears to be low. A detailed assessment of how access to, and allocation of resources influence reach and ability to track effectiveness is needed.

Optimizing quality of life among adults with paraplegia through telerehabilitation: Secondary outcomes of a pilot randomized control trial

Dr Meredith Rocchi¹, Miss Keryn Chemtob¹, Dr Kelly Arbour-Nicitopoulos², Dr Dahlia Kairy³, Ms Brigitte Fillion⁴, **Mr Shane Sweet¹**

¹McGill University, Montreal, Canada, ²University of Toronto, Toronto, Canada, ³Université de Montréal, Montreal, Canada, ⁴CIUSSS du Centre-Sud-de-l'île-de-Montréal, Montreal, Canada

Rapid Fire - Living Well with SCI, Room C2.5, September 15, 2018, 08:00 - 08:55

Introduction. This abstract presents the results of the secondary outcomes of a randomized controlled trial (RCT) aimed at increasing autonomous motivation towards physical activity for adults with spinal cord injury (SCI; for primary outcomes, see submitted abstract by Sweet, Chemtob, Rocchi, Arbour-Nicitopoulos, Kairy, & Fillion).

An 8-week pilot self-determination theory-based RCT was conducted among adults with paraplegia. The intervention consisted of counseling sessions where participants' experiences with physical activity, their motives, and their barriers and facilitators were discussed. The objective was to determine whether intervention participants had greater increases in quality of life related variables (i.e., increased life satisfaction, decreased depressive symptoms, and increased health behaviour participation) compared to control participants.

Methods. 22 adults with paraplegia were randomized to the intervention (n = 10) or control group (n = 12). Participants had a mean age of 51.32 (SD = 12.07), were primarily men (n = 15, 68%), and had been injured for an average of 14.14 years (SD = 12.33). All participants completed self-report questionnaires at baseline, 4, and 8 weeks. Intervention participants received eight weekly counseling sessions, while the control group was asked to keep their daily routine. Hierarchical regressions were conducted and changes in explained variance (ΔR^2) represented small (0.02), moderate (0.13), and large (0.26) effects.

Results. There were no differences in reported life satisfaction or depressive symptoms between the intervention and control groups at four and eight weeks. For health behaviour participation, compared to the control group, the intervention group had moderate changes in participation at four ($\Delta R^2 = .10$) and eight weeks ($\Delta R^2 = .12$).

Conclusions. This pilot RCT is the first to support that self-determination theory and a telerehabilitation intervention are effective for increasing reported health participation for adults with SCI. There is now sufficient support to extend this pilot RCT to a full trial.

Reliability of evaluating instability in distractive extension injuries of the cervical spine by MRI

Dr Masahiro Tanaka¹, Dr Daisuke Sakai¹, Dr Hiroyuki Katoh¹, Dr Akihiko Hiyama¹, Dr Tadashi Nukaga¹, Dr Masato Sato¹, Dr Masahiko Watanabe¹

¹*Tokai University School Of Medicine, Kanagawa, Japan*

Rapid Fire - Miscellaneous Medical 1, Room C2.4, September 14, 2018, 08:35 - 09:30

[Introduction] Distractive extension(DE) injuries of the cervical spine has increased in the aging community. Operative indication depends on the instability of the motion segment. Here, we examined whether DE injuries can be evaluated by MRI.

[Methods] Fifty-nine patients (mean age 68.3 years) treated for DE injuries between 2011 and 2017 were reviewed. Patients were grouped by MRI depending on the extent of injury; injury of anterior longitudinal ligament (ALL) to the intervertebral disc as L group and injuries of posterior longitudinal ligament (PLL) to the posterior soft tissue as M group. Instability was examined by dynamic CT. SLIC score was also used to evaluate the presence or absence of instability, and the ASIA scale.

[Results] The SLIC score of the M group was 4.2, which was significantly higher than that of the L group of 3.2. 73% of the cases in the M group exhibited instability, which was significantly higher compared to the 13.6% of the L group. There was a significant intergroup difference of ASIA classification at the time of injury, with severer paralysis in the M group.

[Conclusions] In DE injuries of cervical spine, injury to the PLL is accompanied by instability of the same injured disc, and the degree of paralysis was also worse. Our results suggested that when injury from the ALL to PLL is observed by MRI in DE injuries of cervical spine, the instability of the affected injured disc may be evaluated without performing dynamic CT analysis.

Administration of the GLP-1 receptor agonist exenatide enhances the ER stress response and improves functional recovery after spinal cord injury

Prof Masahiko Watanabe¹, Dr Hiroyuki Katoh¹

¹*Tokai University School of Medicine, Isehara, Kanagawa, Japan*

Rapid Fire - Functional Outcomes, Room C2.3, September 15, 2018, 08:00 - 08:55

Introduction:

After spinal cord injury (SCI), oligodendrocyte precursor cells (OPC) residing in the spinal cord have been shown to actively proliferate, but many these cells succumb to apoptosis instead of differentiating into functional oligodendrocytes. One of the factors involved in neural cell apoptosis is endoplasmic reticulum (ER) stress. We previously reported that enhancing the ER stress response by administering the diuretic amiloride improved OPC survival and differentiation, enhanced remyelination, and improved hind limb motor and sensory dysfunction. However, considering the unstable hemodynamics in an acute SCI patient, the administration of a drug that lowers blood pressure may not be clinically possible, therefore forcing us to search for another drug.

Glucagon-like peptide-1 (GLP-1) receptor agonists, which are used in the treatment of type 2 diabetes, have recently been shown to exhibit neuroprotective effects and to decrease ER stress. The aim of this study is to examine the effect of the GLP-1 receptor agonist exenatide on the ER stress response in the injured spinal cord and on the functional recovery after SCI.

Methods:

Using a moderate contusive SCI rat model (IH-impactor 200 Kdyne), the GLP-1 group received subcutaneous injections of 10 µg exenatide immediately after and 7 days after SCI, while the control group received no treatment. Blood glucose levels were monitored and hind limb motor function was evaluated using the BBB score. At 1, 3, 7, and 14 days after SCI, spinal cords were excised (n=5 per group) and the expression of GRP78, which acts to decrease ER stress, and CHOP, which induces apoptosis in response to severe ER stress, were examined using Western blot.

Results:

Blood glucose levels rose sharply immediately after SCI and then gradually descended to approximately 100 mg/dl by 12 hours after SCI. No significant difference was observed between the two groups, and hypoglycemia was not observed. Western blot revealed a significant increase in GRP78 expression on Day 3 ($p < 0.01$), and a significant decrease in CHOP expression on Day 14 ($p < 0.05$) in the GLP-1 group compared to the control group. BBB scores revealed significantly higher motor scores in the GLP-1 group from Day 7 and later ($p < 0.01$). Although a direct comparison with animals that received amiloride treatment has not been performed, the improvement in motor function achieved with exenatide administration was higher than that seen with amiloride.

Our results show that administration of the GLP-1 receptor agonist exenatide decreased ER stress and led to significant improvement of hind limb motor function. Considering that GLP-1 receptor agonists have also been shown to decrease oxidative stress, increase the ratio of the neuroprotective M2 microglia phenotype, and increase autophagy, while decreasing cytotoxic hyperglycemia, we believe that GLP-1 receptor agonists are a promising candidate for the pharmacological treatment of SCI.

Conclusions:

Administration of the GLP-1 receptor agonist exenatide enhanced the ER stress response and improved functional recovery after SCI. With many other beneficial characteristics that may improve the condition within the injured spinal cord, GLP-1 receptor agonists have great potential for the treatment of SCI.

Is undernutrition risk associated with an adverse clinical outcome in spinal cord injured patients with severe pressure ulcer – a longitudinal study.

Dr Samford Wong¹, Miss Claudia Dennemont¹, Miss Clare Hiller¹, Dr Aga Louw¹, Dr Allison Graham¹, MR Mofid Saif¹

¹Stoke Mandeville Hospital, Aylesbury, United Kingdom, ²City, University of London, London, United Kingdom

Rapid Fire - Miscellaneous Medical 2, Room C2.3, September 14, 2018, 13:45 - 15:15

Introduction: Pressure ulcers (PU) are serious, costly and potentially life-long complications of spinal cord injury (SCI). Co-morbid conditions such as reduced mobility, sensory impairment and old age have been identified as risk factors for PU but others such as nutrition-risk is debated^{1,2}. The objective of this study is to (1) establish the incidence and location of grade 3 or above PU; (2) describe the prevalence of undernutrition risk using the Spinal Nutrition Screening Tool (SNST)³ and hypoalbuminemia (serum albumin <25g/L) and; (3) evaluate whether under-nutrition risk is associated with a worse clinical outcome in respect of length of in-patient hospital stay (LOS); bed-rest days and mortality within 12 months of admission to SCI centre.

Methods: A retrospective review of patients admitted for PU management from January 2012 to December 2015 at the National Spinal Injuries Centre, Stoke Mandeville, UK was completed. Data collected included PU, medical and nutrition history as well as LOS, duration of bed-rest and mortality within 12 months of admission.

Results: A total of 2,411 patients were admitted during January 2012 to December 2013, of which 127 (5.2%) patients (mean age: 58 years; 21.3% female) with SCI (27.5% tetraplegia; 86.4% complete SCI) were admitted for PU management with a grade 3 or above PU. The top 3 sites for PU were Ischium (57.9%); Sacrum (20.6%) and Trochanter (10.3%). None of these patients had trace-elements checked. Only 48 (37.8%) of patients were referred for nutrition assessment / intervention. These patients tends to have multiple PU (50% v 25.3%, $p < 0.01$) and lower serum-albumin (g/L: 25 v 31, $p < 0.01$). The patients initially undernourished or at-risk of undernutrition (70.1%) had a significantly longer LOS (SNST: 100d v 49d, $p < 0.01$); longer bed-rest days (hypoalbuminemia: 103 v 49d, $p < 0.01$) and higher 365d mortality (hypoalbuminemia: 25.7% v 4.5%, $p < 0.01$).

Conclusion: Many factors contribute in the development, course and treatment of PU. The present study suggests that under-nutrition risk, as identified by the SNST and hypoalbuminemia, is associated with adverse clinical outcome. Routine nutrition screening should be helpful in improving clinical outcomes if it promotes more appropriate and effective nutrition intervention. Further study should address whether nutrition intervention is cost- and clinically- effective.

References

1. National Institute for Health and Care Excellence (2014) Pressure ulcers: prevention and management of pressure ulcers. NICE, London. <http://bit.ly/1GkYJra>
2. Consortium of Spinal Cord Medicine: Pressure ulcer prevention and treatment following spinal cord injury: a clinical practice guideline for health-care professionals. Paralyzed Veterans of America. <http://bit.ly/2CjQfIH>
3. Wong et al. (2012) Eur J Clin Nutr 66, 382-387.

The efficacy of fesoterodine for the treatment of neurogenic detrusor overactivity and/or low compliance bladder in spinal cord injury patients

MD Tomonori Yamanishi¹, MD Kanya Kaga¹, MD Miki Fuse¹, MD Mayuko Kaga¹, MD Mitsuru Ishiduka¹
¹Continenace Center, Dokkyo Medical University, Tochigi, Japan

Rapid Fire - Bowel and Bladder, Room C2.4, September 14, 2018, 13:45 - 15:15

Introduction: The aim of the study is to evaluate the efficacy of fesoterodine for neurogenic detrusor overactivity (NDO) or low-compliance bladder (LCB) in spinal cord injury patients by urodynamic study (UDS).

Methods: The participants enroll in this study are required to be off all previous treatments that might influence voiding function for 2 weeks, and to maintain a frequency volume chart (FVC) for 3 days after 1 week of washout. Following the 2 weeks washout period, the participants receive fesoterodine 4mg/day for 12 weeks. UDS was performed before and at three months following treatment.

Results: 49 patients with NDO (N=42) and/or low compliance bladder(N=7) were studied. The median age was 54.2□21.7 years old. The most frequent adverse event was dry mouth in 2 patients and constipation in 1 patient. Urodynamic study could be performed both before and after the treatment in 43 patients. In urodynamic study, maximum cystometric capacity, bladder volume at first involuntary contraction increased significantly (from 250ml to 320ml, P=0.0001, and from 192mL to 230mL, P=0.0007, respectively), and maximum involuntary detrusor contraction pressure decreased significantly (from 46.5 to 23.2 cmH₂O, P=0.030) at 12 weeks of treatment compared with the baseline. In bladder diary, number of voids, number of urgency episodes, number of incontinence episodes, and number of pad changes (/day) decreased significantly (from 6.79 to 6.11, P=0.040, from 2.439 to 1.23, P=0.049, and from 1.48 to 0.80, P=0.034, respectively), and mean voided volume and maximum voided volume/ micturition increased significantly (from 181.7 to 224.6, P=0.037, and from 310.72 to 383.8, P=0.042, respectively) at 12 weeks of treatment compared with the baseline.

Conclusions: Fesoterodine was effective in increasing bladder capacity and decreasing incontinence in spinal cord injury patients with NDO and/or low compliance bladder.

How use of a Database can enhance an expert Tetraplegic Hand clinic Service.

Mrs Jayne Yeomans¹, Dr Claudia Gschwind^{1,2}, Dr James Ledgard^{1,2}

¹Royal North Shore Hospital, Sydney, Australia, ²Sydney Hand Surgery Associates, North Shore Private Hospital, Sydney, Australia

Rapid Fire - Upper Extremity, Room C2.3, September 14, 2018, 08:35 - 09:30

How use of a Database can enhance an expert Tetraplegic Hand clinic Service.

Jayne Yeomans - Senior Spinal Cord Injury Physiotherapist, RNSH, Australia

Dr Claudia Gschwind - Hand Surgeon, RNSH, Australia

Dr Jame Ledgard – Hand Surgeon, RNSH, Australia

Introduction

The Tetraplegic Hand clinic at Royal North Shore Hospital in Sydney has been running for more than 25 years. The clinic is available to both newly injured and established Spinal Cord Injured (SCI) patients in the state of NSW and the ACT. All new appropriate patients are referred to the one clinic for advice on management and surgical options during their inpatient stay.

Method

Our database was set up in 2005 as a way to streamline and gather real time information during each individual patient assessment. Information collected includes patient history, manual muscle testing, joint range, surgical and non-surgical options for optimum management as well as outcome measures such as the Canadian occupational performance measure.

Result

The database allows us to easily track patient's attendance at clinics, to know exactly what issues have previously been discussed, procedures performed and the plans and follow-ups required for ongoing care. We can use the data collected to run reports, for example on the type and number of surgeries performed, where patient referrals come from, type of injuries seen etc.

It currently contains information on more than 530 patients who have attended the monthly clinics over a 23 year period.

Conclusion

The aim of our presentation is to highlight how the use of a database can enhance patient access to a specialised clinic. To demonstrate how it improves service delivery by having all past and current information available during a consultation and allows accurate collection of both assessment and outcome measures.

A

Abedi, Aidin	390
ACT International Working Group,	390
Adair, Bill	279
Alexander, Tara	409

Alve, Yeasir	100
Anderton , MIke	196
Anghelescu, Aurelian	390
Arbour- Nicitopoulos, Kelly	411

B

Barclay, Linda	21
Baroncini, Ilaria	91
Berlowitz, David	60
Biering-Sørensen, Fin	390
Bonatti, Enrica	91
Bonavita, Jacopo	91

Bontje, Peter	100
Bourbeau, Dennis	151
Bourke-Taylor, Helen	21
Bragge, Peter	281
Brown, Douglas	284
Byrne, Catherine	281

C

Capell, Jacquelin	409
Champs, Ana Paula	150
Chan, Brian	381
Chang, Shuo-Hsiu	126
Chari, Priya	204
Charlifue, Susan	181, 126
Chemtob, Keryn	411
Cheng, Christiana	390
Chhabra, Harvinder S.	390
Chotiyarnwong, Chayaporn	223

Clark, Jillian	196
Coker, Jennifer	181
Conradsson, David	174
Cooper, Catherine	320
Cooper, Catherine	241
Craven, B. Catharine	381
Creasey, Graham	151
Cronin, Shawna	381
Croot, Tracey	208
Curt, Armin	29

D

Dalal, Brinda	404
Dennemont, Claudia	142

Desneves, Kate	284
----------------	-----

E

Edgerton, Reggie	380
Elmo, MaryJo	395

Emmanuel, Anton	242
Erskine , Erin	417

F

Field-Fote, Edelle	126
Fillion, Brigitte	411
Fisher, Murray	350
Flood, Stephen	241
Fossey, Mary	417

G

Gad, Parag	380
Galea, Mary	284
Gall, Angela	242
Gil-Agudo, Angel	390
Giovannini, Giulia	91
Giovannini, Tiziana	91
Goodwin , Denise	281

H

Haraya, Kentaro	205
Harvey, Lisa	190
Hayes , Brian	417
Haylen, Denise	350
Hearn, Jasmine	12
Heinemann, Allen	126
Herbert, R.D.	190
Hill, Bridget	320

I

Inanici, Fatma	380
Ishiduka, Mitsuru	35

J

Jaglal, Susan	381
Jaramillo, Jeffrey	404
Jayaraman, Arun	126
Jiri, Kritz	29

K

Kaga, Kanya	35
Kaga, Mayuko	35
Kairy, Dahlia	411
Kalke, Yorck	76
Kammuang-lue,	223

Freeman , Brian	196
Frotzler, Angela	76
Furbish, Cathy	126
Fuse, Miki	35

Gopalan, Ramya	404
Graco, Marnie	60
Graham, Allison	142
Green, Sally	60
Greene, Jessica	404
Greve, Júlia	390
Gschwind, Claudia	319

Hiller, Clare	142
Hisada, Yuichiro	205
Hiyama, Akihiko	119
Hofstetter, Christoph P.	380
Hossain, Mohammad Sohrab	190
Howard-Brown, Christine	208
Hultling, Claes	356
Hunter, Diana	417

Islam, M.S.	190
-------------	-----

Jones, Sonia	164
Jones, Tony	282
Joseph, Conran	174, 175

Kiratli, Jenny	404
Komaratat, Napasakorn	223
Komatsu, Miki	205
Konomi, Tsunehiko	205
Kovindha,	223

Pratchayapon
Katoh, Hiroyuki 119, 11
Khan, Nasser 390
Mehrab

Apichana
Kwan, Kenny 390

L

Ledgard, James 319
Lee, Geoff 241
Lennox, Alyse 281
Lentin, Primrose 21
Leong, Grace 350

Lilley, Margot 282
Liu, Nan 390
Louw, Aga 142
Lukersmith, Sue 282

M

Mahachai, 223
Rungarun
Maia, Gabriela 150
Afonso Galante
Maier, Doris 29
Mair, Yvette 164
Marani, Manuela 91

Middleton, James 390

Miller, George 241

Martin Ginis, 279
Kathleen
Matsumoto, 205
Satoko
McBride, Chris 279
McDonald, Rachael 21

Minami, Akio 205
Molinari, Marco 29
Moosburger, 76
Juergen
Moritz, Chet T. 380

Moslavac, Sasa 390

Melo, Gustavo 150
Correa Netto

Muldoon, Stephen 190
Mummidisetty, 126
Chaithanya
Musumeci, Gaia 91

N

Nalon, Claudio 91
Nilsson Wikmar, 174, 175
Lena
Noonan, Vanessa 390

Nukaga, Tadashi 119
Nunn, Andrew 281, 284

O

Oliveira, Fabiana 150
Gonçalves
Onders, Raymond 395

Ozaki, Masahiro 205

P

Panisset, Maya 284
Parashar, Divya 31
Passananti, 242

Phillips, Julie 174, 175
Pinto, Daniel 126
Poormasjedi- 417

Valentina

Patel, Alpesh 390
Pattanakuhar, 223
Sintip

R

Rafferty, Jillian 284
Rahimi-Movaghar, 390
Vafa
Rahman, Akhlas 190
Rainer , Abel 29
Rao, Prashanth 196

S

Saif, Mofid 142
Sakai, Daisuke 119
Samejima, Soshi 380

Sato, Masato 119
Schouten, Rowan 390
Schubert, Martin 29
Scivoletto, Giorgio 390, 29
Shaw, Robert 279

T

Tanaka, Masahiro 119
Taylor, Heather 126

Tefertiller, Candy 126
Thiruppathy, 242
Kumaran

U

Urquhart, Susan 390

V

Vainionpää, Aki 390
Van Zyl, Natasha 241

V

van Zyl, Natasha 320

W

Meibod, Malihe-
Sadat

Prévinaire, JG 390
Pryor, Julie 350

Rocchi, Meredith 411
Rodger, Sian 394

Rodi, Helena 284
Rogers, Daniel 208
Rupp, Rudiger 29

Simmonds, Frances 409
Singhal, Raj 208
Soares, Maria 150
Marta Sarquis
Spraggins, Jamal 126
Stampas, Argyrios 126
Suda, Kota 205
Sweet, Shane 411
Sweet, Shane N 279

Tonge, Jeff 282
Torabiardakani, 196
Shabnan
Torre, Monica 29
Trivedi, Prateesh 242

Volini, Silvia 91
Voth, Jennifer 381

Ward, Leigh 284
Watanabe,
Masahiko 119, 11
Weidner, Norbert 29

West, Christopher 417
Weymouth,
Michael 241
Wong, Samford 142

Y

Yamanishi, 35
Tomonori
Yeomans, Jayne 319

York , Kalke 29
Young, Leah 208

Z

Zarate-Lopez, 242
Natalia