The Proceedings of the 2000 Sixth International Physiotherapy Congress of the Australian Physiotherapy Association contains either full papers, short abstracts or extended abstracts of the posters and presentations given at the Congress. The contents of this volume have been compiled by the Scientific Congress Committee and prepared from material supplied by the authors in hard form and electronically. The correctness or otherwise of the material herein contained is the responsibility of the individual authors. Any enquiries concerning articles in this volume should be directed to the individual authors. All papers, posters and presentations have been peer reviewed.

These proceedings were sold at the Congress and are available to others at cost from the National Office of the Australian Physiotherapy Association.

ISBN 1-875107-10-X

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Publisher
Australian Physiotherapy Association (ACT Branch)
Suite 10/1st floor
16 National Circuit
Barton ACT 2600 Australia
Proceedings

The Sixth International Physiotherapy Congress

24-27 May 2000
Canberra ACT
CONTENTS

Principles Of Motion Analysis  
_Sylvia Oumpuu_........................................................................................................... 1

Functional Anatomy Of Tendons  
_Moira O'Brien_............................................................................................................ 2

CONCURRENT SESSION 1

Movement Analysis Symposium - Applications Of Motion Analysis To Clinical Practice  
_Presenters: Sylvia Oumpuu, Jaap Hallaar, Rodyn Boyd_................................................. 3

CONCURRENT SESSION 2

Physiotherapy Competency Standards in Paediatrics  
_Fiona Payne_.................................................................................................................. 4

Introduction of the Swash Orthosis into Australia in the Context of a Randomised Controlled Trial  
_J Parrott, G Burchall, K Cozzio, G Nattrass, H Graham, R Boyd_...................................... 6

Flexible Flatfoot Deformity: A Study of the Motor Skills, Pain, Fitness and Gait of 180 Children with Flexible Flatfoot Deformity  
_Deidre Whitford, Adrian Esterman_................................................................................ 7

Complications Following Single Event Multi-Level Surgery in Children with Spastic Diplegia Incidence, Classification and Consequences  
_Adrienne Harvey, K Graham, G Nattrass, A McCoy_......................................................... 9

CONCURRENT SESSION 3

An Analysis of the Home Environment Encountered by Stroke Patients  
_Patricia Goldie, D Kay, A Patla_.......................................................................................... 10

A Clinical Audit of a Community-Based Falls and Balance Clinic  
_AJ Burdon, M Sutherland, Mackintosh SFH, English JM, Mykety LJ_................................. 12

Benchmarking Outcomes and Resource Utilisation for Patients with Severe Disability after Stroke  
_Stephen Vale, K Brock_.................................................................................................... 14

Investigating Quality of Life Measurement in Neurological Outpatients  
_Catherine Culhane, K Teo, P Disler, Dr Graeme Hawthorne_.............................................. 16

Deep Brain Stimulation in Parkinson's Disease: The Physiotherapists Role in Monitoring Progress  
_Frances Huxham, R Iansel, M Morris_................................................................................ 18

CONCURRENT SESSION 4

The Evolution of a Physiotherapy Service: A Context-Driven Practice Framework  
_Catherine Noack_............................................................................................................. 19

Prevention of Injury: Guidelines for Physiotherapy Practice  
_Jean Cromie, M Best, V Robertson_.................................................................................. 23

Succession Planning into Management  
_Lauren Andrew, S Vale, V Wolfsom_.................................................................................. 25

The Experiences of Physiotherapists with Work Related Musculoskeletal Injury  
_Jean Cromie, V Robertson, M Best_.................................................................................... 27
Collective Alliances with Consumers and Key Providers: A Paradigm Shift  
Anne McCoy................................................................. 28

PLENARY SESSION

Pain – Scientific Basis Of Current And Future Practice  
Michael Cousins........................................................... 30

Education – Professional Knowledge And Its Place In Education  
Joy Higgs........................................................................ 31

CONCURRENT SESSION 5

The Effects of Physiotherapy Strategies on the Kinematics and Kinetics of Gait in Parkinson's Disease  
Meg Morris, J McGinley, F Huxham, R Lansek ................................................................. 35

Foot Motion During the Stance Phase of Walking: Implications for Existing Theories of Motion  
Adrienne Hunt, R Smith, M Torope......................................................... 37

Obstacle Negotiation in Healthy Elderly and Young Subjects  
Jack Crosbie, N Gan ................................................................. 39

Obstacle Crossing in Subjects with Stroke and Healthy Elderly Subjects  
Catherine Said, P Goldie, A Patla, W Sparrow......................................................... 40

CONCURRENT SESSION 6

Lifting, Carrying and Placing Abilities in Young Children  
Raeanne Shields, Y Burns......................................................... 41

Timed Up-and-Go in Children: An Outcome Measure Borrowed From the Other End of the Life Span  
Elizabeth Williams, S Carroll, M Galea......................................................... 42

Validity of a Clinical Measure of Spasticity in Children with Cerebral Palsy in a Randomised Clinical Trial  
Roslyn Boyd, S Barwood, C Baillieu, H Graham......................................................... 43

Accuracy and Reliability of Observational Gait Analysis: Judgements of Ankle Power in Gait After Stroke  
Jennifer McGinley, P Goldie, K Greenwood, S Olney......................................................... 44

CONCURRENT SESSION 7

Inter-Rater Reliability of Pelvic Floor Muscle Testing: Physiotherapy Multicentre Incontinence Study  
Patricia Neumann, V Gill, K Grimmer, R Grant......................................................... 45

Physiotherapy Management of SUI in Women: A Multi-Centre Study – Characteristics of 233 Subjects  
Patricia Neumann, V Gill, K Grimmer, R Grant......................................................... 46

Pelvic Floor Muscle Activity during Abdominal Manoeuvres  
Ruth Sapsford, Hodges.................................................................. 49

Introduction of a Postgraduate Certificate Course in Physiotherapy – Continence and Pelvic Floor Rehabilitation  
M Sherburn, E Tully, J McMeeken......................................................... 50

CONCURRENT SESSION 8
Evaluation of Work or Earning Capacity of Workers with Neck and Back Pain: Is there a Role for Physiotherapists?
*Eva Schonstein, D Kenny, M Cohen* ................................................................. 51

Measurement of Spinal Alignment on the Simmons Range of Mattresses
*Pat Trott, K Grimmer, S Milanese* ............................................................... 53

A Pilot Study Evaluating a Specific Functional Exercise and Education Program for Chronic Low Back Pain
*Anna-Louise Bowvier* .................................................................................. 55

A Profile of Chronic Low Back Pain Patients Using Validated Outcome Measures
*Anna-Louise Bowvier* .................................................................................. 56

Performance of the Brace Tests by 13 Year Old High School Students and Association with Reports on Injury
*Pat Trott, Tiffany Gill, K Grimmer* ............................................................ 57

**WORKSHOP**

Vicims Of Trauma Meeting ........................................................................ 58

**PLENARY SESSION**

Gait Across The Ages
*Sylvia Oumpuu* ......................................................................................... 60

Evidence Based Practice: Interpreting, Producing And Justifying Evidence
*Joy Higgs* .................................................................................................. 61

Strategic Focus For Physiotherapy Research Workshop - Victorian Research Group
*Suzanne Capell, Peter Michael Kent, Jenny Keating* .............................. 64

**CONCURRENT SESSION 9**

Medium Term Outcomes and Risk Factor Analysis of Botulinum Toxin A in the Management of Children with Cerebral Palsy
*Roslyn Boyd, J Graham, G Nattrass, H Graham* ....................................... 65

Hip Surveillance for Children with Cerebral Palsy: Striving for Clinical Best Practise
*R Boyd, Fiona Smithson, J Parrott, G Nattrass, H Graham* ........................ 66

Energy Expenditure During Rehabilitation of Children Following Femur Fracture in a Randomised Controlled Trial
*Roslyn Boyd, J Wong, R Wolfe, G Nattrass, H Graham, JG Wright* ....... 67

**CONCURRENT SESSION 10**

Dance Injury in Australia: A Comparison Study
*Debra Crookshanks* .................................................................................. 69

Strength Training Versus Endurance Training Effects on Strength, Pain, Musculoskeletal Injuries and Perceived Exertion of Playing in Tertiary Music Students
*B Ackermann, R Adams, E Marshall* ......................................................... 70

Melbourne’s Clinical School Model for Physiotherapy
*Joan McMeeken* ....................................................................................... 71

**CONCURRENT SESSION 11**
Moving Through Shoulder Assessment - A Multi Media Approach to Learning
Heather Bond................................................................................................................. 73

Experiences with Computer Based Tutorials in Physiotherapy Education
Styline Mackintosh........................................................................................................... 74

ANATOMEDIA™
A New Approach to Medical Education Developments in Anatomy
Christopher Briggs, N Eizenberg, P Barker, I Grkovic....................................................... 75

CONCURRENT SESSION 12

Posters................................................................................................................................ 77

PLENARY SESSION

Structure Metabolism And Ageing Of Tendons
Moira O’Brien....................................................................................................................... 110

Cardiopulmonary Rehabilitation – Evidence Based Practice And Outcome Measures In Clinical Practice
Sue Jenkins............................................................................................................................. 111

RETIRED PHYSIOTHERAPISTS MEETING................................................................. 112

QUALITY WORKSHOP
Quality Management in Physiotherapy: A Practical Perspective
Elizabeth Moorfield, Robert Huddle .................................................................................... 113

SKILLS WORKSHOP
How to Deliver Dynamic Presentations or Physiotherapists Learning New Tricks
Gill Whitehouse .................................................................................................................. 114

PILATES WORKSHOP -
Balance, Physiotherapy and Pilates
Sonja Schultz ...................................................................................................................... 116

PLENARY SESSION

Evidence Based Clinical Decision Making
Jill Cook ............................................................................................................................... 117

Where In The Brain Is Pain?
Philip Siddall ...................................................................................................................... 118

PLENARY SESSION

PRF Oration
Jack Crobie ........................................................................................................................ 121

Exercise Testing And Prescription For People With Chronic Lung Disease
Sue Jenkins ............................................................................................................................ 122

EDUCATION SYMPOSIUM

Problem Based Learning in Physiotherapy Education
Louisa Remedios, Debbie Virtue, Gillian Webb ................................................................. 123
SCIENTIFIC WRITERS WORKSHOP .................................................................................. 124

CONCURRENT SESSION 13

Pain Symposium -
Yes Madam All Your Pain Is In Your Brain
Philip Siddall, Mary Galea, David Butler ................................................................. 125

CONCURRENT SESSION 14

Development of an Ankle Movement Discrimination Test Which is Independent of Balance
Gordon Waddington, R Adams .................................................................................... 126

Inversion – Eversion Proprioception in Recurrent Ankle Sprains – The Effect of Taping
Kathryn Refshauge, S Kilbrenn, J Raymond, I Heijnen, L Pengel .................................. 127

A Reduction in the Incidence of Injuries in Pre-Season Rugby League Training after the Introduction of an Injury Prevention Program
Mark Alexander ........................................................................................................ 129

Factors Affecting Shoulder Movement Detection Measured with an Isokinetic Dynamometer
P Janwantanaukul, MF Magarey, MA Jones, KA Grimmer, TS Miles ............................... 134

CONCURRENT SESSION 15

The Effect of Training Manual Hyperinflation on Technique Performance and Airway Pressure Delivery
Bill Zafropoulos, F Li .................................................................................................. 135

Sternal Instability Following Coronary Artery Bypass Grafting
Doa'El Ansary, L Toms, R Adams, M Elkins ................................................................. 137

Outcome Measures in Physiotherapy Management of pre and post heart and lung transplant patients in Australia and New Zealand
Carol Greenham, M Williams ...................................................................................... 138

The Effects of Standard and Modified Postural Drainage Positions on Oxygen Saturation & Heart Rate in Infants with Cystic Fibrosis
Brenda Button, A Olinsky, A Catto-Smith, I Story .................................................... 139

CONCURRENT SESSION 16

Early Range of Motion (0°-110°) Following Total Knee Arthroplasty
M Mason, SL Keays ..................................................................................................... 140

Randomized Controlled Clinical Trial: Predictors of Physiotherapy Treatment Responsiveness for Patients with Osteoarthritis of the Knee
M Fransen, J Edmonds, J Crobie .................................................................................. 141

Randomised Controlled Clinical Trial: Two Forms of Physiotherapy for Patients with Osteoarthritis of the Knee
M Fransen, J Edmonds, J Crobie .................................................................................. 143

CONCURRENT SESSION 17

Putting Evidence Based Practice into Practice: A Model for Hospital Centered Professional Development
Julie Bernhardt, E Cashill, S Hull ................................................................................ 145
Issues Relating to the Future Role of the Physiotherapists as a Manual Handling Trainer in Australia
Rose Boucaut ........................................................................................................ 146

Above and Beyond Patient Care: Meeting Clinicians Needs in Providing Education
Geraldine Millard, Lauren Andrew, G Webb .......................................................... 148

Professional Education in the Workplace: Moving Above and Beyond Staff Support
Catherine Noack, Ann Webster-Wright ................................................................. 150

Barriers to Research in Acute Physiotherapy Practice
Patricia Bate, V Wulstobn, R Kirkby ...................................................................... 153

WORKSHOP
Working Better With Students
Dawn Best, Rosemary Isles, Gillian Webb, Vicki Williams .................................... 154

CONCURRENT SESSION 18

The Effect of Wheelchair Self-Propulsion by Hemiplegic Patients on Spasticity and Function
Lyndell Keating, I Story, A Winter ......................................................................... 155

Recovery Profiles of Strength, Dexterity & Function During the First 6 Months Following a Stroke
Colleen Canning, L Ada, N O'Dwyer ...................................................................... 157

Who Deserves Rehabilitation? Ability of Physiotherapists to Predict Destination Outcomes for Stroke Patients
Lyndell Keating, L Andrew .................................................................................... 158

Time Course of Adaptation to a Changed Sensory-Motor Relation
Malene Bhargava, Nj O'Dwyer .............................................................................. 159

The Effect of Stroke on Walking Speed on Indoor and Outdoor Surfaces at Comfortable and Fast Paces
Joan Stephens, PA Goldie ........................................................................................ 160

CONCURRENT SESSION 19

Clinical and Sonographic Measurements of Finger Flexor Tendons in Recreational Rock Climbers
Melissa Gaal, H Reisch, M Williams, M McEvoy .................................................... 161

Connections Between the Posterior Layer of Lumbar Fascia and Lower Limb Muscles
Priscilla Barker, C Briggs ....................................................................................... 162

Does Low-Intensity Pulsed Ultrasound Affect Bone Mineral in Rodents Following Ovariectomy?
S Warden, K Bennell, M Forwood, J McMeeken, J Wark ....................................... 164

Trunk Motion During Walking as Pregnancy Progresses
Wendy Gilteard ........................................................................................................ 165

CONCURRENT SESSION 20

What do Outcome Scores Mean? Relationships between Outcome Measure Scores and Discharge Disposition Following Stroke?
Kim Miller, A Mathers, D Howie, K Lu ................................................................... 166
Outcome Measurement Following Traumatic Brain Injury: Implications for the Clinician and Directions for Future Research
Nancy Low, Goy, R Isles, M Richards ................................................................. 167

Relationship Between Clinical Measures of Function in People with Parkinson’s Disease
Rebecca Liston, J Cole .................................................................................. 169

Rating the Severity of Pushing in Stroke Patients: A Reliability Study
Andrea King, L Keating ........................................................................... 172

CONCURRENT SESSION 21

Recovery of Shoulder Movement and Incidence of Lymphoedema After Breast Cancer Surgery: Evaluation of a Physiotherapy Rehabilitation Program
Robyn Box, J Bullock-Saxton, H Real-Hirche, C Furrul ........................................ 173

Functional Difficulties Reported by Those with Wrist Disorders
Andrea Bialocerkowski, K Grimmer, G Bain ..................................................... 174

A Randomised Controlled Trial into the Effects of a Positioning Program on Maintenance of Shoulder Range Following Stroke
Louisa Ada, J Bamfont, E Goddard, J McLean, T Starvinnos, S Murtagh, L Russell, E Tucker .............................................................. 176

An Investigation of the Upper Limb Tension Test in Hemiplegia
Maureen Stanic, P Lew, M Gales ..................................................................... 177

Is there a Causal Relationship Between Spasticity and Contracture Following Stroke?
Louise Ada, N O’Dwyer, E Pitman ................................................................ 178

CONCURRENT SESSION 22

Physiotherapy Intervention – Predictions and Productions
Vivienne Wulfsen .................................................................................. 179

Evidence Based Practice – But Who Actually Does It?
Lauren Andrew ....................................................................................... 183

Evidence for Physiotherapy Practice – A Survey of the Physiotherapy Evidence Database (PEDro)
Anne Moseley, R Herbert, C Sherrinton, C Maher ................................... 184

The APA Quality Endorsement Programme: A Catalyst for Change
Elizabeth Moorfield .............................................................................. 186

REHABILITATION SKILLS WORKSHOP
Teaching Running in Traumatic Brain Injury
Gavin Williams ..................................................................................... 187

FELDENKRAIS WORKSHOP
An Argument for the Inclusion of Feldenkrais Principles in the Curriculum of Undergraduate and Postgraduate Physiotherapy Courses
Nick Martin ........................................................................................ 188

PEDro WORKSHOP
Introduction to Evidence-Based Practice
Ann Moseley, Robert Herbert, Christopher Maher ........................................ 190

PLENARY SESSION

Peptides And Pain
Arthur Duggan ..................................................................................... 191
APA - Pre-Manipulative Testing Protocol - Researched And Renewed
Trudy Rebbeck, M Magarey, K Grimmer ........................................... 192

MPAA Position Statement On The Efficacy Of Physiotherapy Management Of
Neck Pain
James Schomburg, J Costello, G Jull ........................................... 193

TISSUE SCIENCE SYMPOSIUM
Jill Cook ......................................................................................... 194

TISSUE SCIENCE SYMPOSIUM
Paul Visentini .............................................................................. 195

TISSUE SCIENCE SYMPOSIUM
Craig Purdam .................................................................................. 197

CONCURRENT SESSION 23
Predicting Running Ability Following Traumatic Brain Injury
Gavin Williams, P Goldie ................................................................. 198

Locomotor Training in Chronic Stroke: Multiple Single Case Design
Catherine Dean, C Richards, F Malovin ................................................ 199

Walking Speed over 10 metres Overestimates Locomotor Capacity after Stroke
Catherine Dean, C Richards, F Malovin .................................................. 200

Measurement of the Ability to Stand Up From the Lowest Possible Chair Height:
Procedure and Interrater Reliability
Geraldine Ho, K Schurr, C Sherrington, P Pamphlett, L Gale.................. 201

CONCURRENT SESSION 24

The Effectiveness of Manipulation and Mobilisation for Headaches: A Critical
Review of Literature and Implications for Evidences Based Practice
VS Kumar ..................................................................................... 202

Treatment
Ian Starkey, C Maher, J Latimer ......................................................... 203

Rhythmic Stabilisation: EMG Activity of Lower Trunk Muscles in Asymptomatic
Males
Shylie Mackintosh, J Lawer .............................................................. 204

Mechanically Evoked Motor Responses During Elbow Extension in Upper Limb
Tension Test Position
Shapour Jaberzadeh, Scutter S, Nazeran H, Warden-Flood A .................. 206

CONCURRENT SESSION 25

Providing Education Opportunities Beyond our Shores: the Operation India
Experience from the Student's Perspective
Elizabeth Henley, R Twible, K Thompson .......................................... 207

The Attitudes and Beliefs of Physiotherapy Students to Chronic Back Pain
Jane Latimer, C Maher, K Refshauge ................................................ 209

Clinical Education Program Development in Changing Times
Cheryl Hobbs, E Henley, J Higgs, V Williams ..................................... 210

Mentor Programmes: Meaningful or Mythical?
Anne McGer ..........................................................
Towards Best Practice in the Physiotherapy Management of Pain-Integration and Outcomes of an Evidence Based Treatment Model
Megan Dalton, G Cockfield ......................................................................................................................... 213

CONCURRENT SESSION 26

Three Dimensional Rotation of the Lumbar Spine Measuring in Standing or Sitting Does it Matter?
Guy Van Herp, P Rowe, P Salter, J Paul ........................................................................................................ 214

Lumbofemoral Rhythm During Active Hip/Knee Flexion in Young Adults and Children
Prajaka Wagh, E Tully, M Gales ..................................................................................................................... 215

A Comparison of Treadmill and Overground Running for Measuring and Three Dimensional Kinematics of the Lumbo-Pelvic-Hip Complex
Anthony Schache, K Bennell, P Blanch, D Rath, R Starr, T Wrigley ............................................................ 216

The Use of Video Fluoroscopy in the Assessment of Instability of the Lumbar Spine
Charles Flynn, I Story, P Leu .......................................................................................................................... 217

Effect of Pelvic Rotation on Lumbar Posteroanterior Stiffness
Wumen Chansirinukor, M Lee, Jane Latimer .................................................................................................. 219

REHABILITATION SYMPOSIUM

Cardiac Rehabilitation: Evidence for Practice and Challenges Beyond 2000
Helen McBryne ............................................................................................................................................... 221

Aquatic Physiotherapy in Rehabilitation
Judy Larsen ...................................................................................................................................................... 222

Maximisation of Functional Output for the Lower Limb Amputee
Catherine McCarthy ........................................................................................................................................ 223

CONCURRENT SESSION 27

Irritability: Possible Contributions from the Spinal Cord
David MacAdams ........................................................................................................................................... 224

The Pain Impact Scale (PIS): Development and Validation
Dianna Kenny, Eva Schönstein, Suzanne Jones ............................................................................................... 226

Sphygmomanometer – Induced Increases in Forearm and Hand Volume
Rob Boland, R Adams ...................................................................................................................................... 228

A Critical Appraisal of Musculoskeletal Pain Instruments – A Clinical Physiotherapy Perspective
Andrea Bialocerkowski, K Grimmer ............................................................................................................ 229

CONCURRENT SESSION 28

Community Exercise and Education – A Diversified Physiotherapy Approach
Annette Brown, K Devereux, C Emmerson, S Fullarton ............................................................................ 231

CONCURRENT SESSION 29

Influence of Aerobic Treadmill Exercise on Blood Glucose Homeostasis in Non-Insulin Dependent Diabetes Mellitus (NIDDM) Patients
G Arun Maira, Rao Kumar Sharath, Hande Manjunath ............................................................................... 233
Evaluation of a Long-Term Water Exercise Program for the Elderly: Focusing on Balance
Susan Josephson, J Nitz, D Josephson .......................................................... 234

Effects of 4 Weeks of Daily Stretching on Ankle Flexibility in Recently Injured Spinal Cord Injured Patients
Lisa Harvey, J Crosbie, R Herbert, J Batty, S Poulter ........................................ 235

Physiotherapy and Adherence to Exercise in Health Management
Adrian Schoo, G Kolt .................................................................................. 238

The Efficacy of Circuit Classes in Improving Locomotor Function After Stroke
Catherine Dean, C Richards, F Malovin ....................................................... 240
OBSTACLE CROSSING IN SUBJECTS WITH STROKE AND HEALTHY ELDERLY SUBJECTS

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Introduction An important goal of rehabilitation following stroke is to retrain gait to safely accommodate the complexities of the everyday environment. A study by Forster and Young demonstrated that safety of gait is often compromised in the stroke patient population, with a large proportion (73%) of stroke patients falling at least once. Obstacles were implicated in 10% of these falls. Obstacle crossing has been identified as a task which is frequently performed by stroke patients following discharge from rehabilitation (Kay, 1998). Since little is known about obstacle crossing following stroke, the aim of the study was to compare obstacle crossing ability in stroke patients with a group of healthy elderly subjects.

Method Twenty four stroke patients, who were receiving inpatient rehabilitation and were able to walk 10m unassisted, were tested after a median time interval of 27 days post stroke. A control group of 22 healthy subjects, matched for age, gender and height were also tested. Subjects were tested on two occasions. All subjects were required to step over a small obstacle (1 cm, 4 cm or 8cm) placed in the middle of a 10m walkway. The obstacle was either attached vertically to the floor to represent a high obstacle, or flat on the ground to represent a wide obstacle. Subjects also performed two unobstructed trials, resulting in a total of eight trials in a session. The order of testing was counterbalanced. A rail was positioned on the subject's unaffected side, however subjects were instructed to use it only if they felt unsafe. Subjects wore a safety belt, and were accompanied by a physiotherapist. A single VHS video camera was used to record the trials.

Subjects were rated as 'pass' or 'fail' for each trial, and the leading limb was noted. The 'Video Distance and Angle Measurer'11 was used to derive several distance and temporal parameters of gait from the videotape. Comparisons were made between the two groups for each orientation separately, using the Mann Whitney U test. The type 1 error rate was adjusted to .017 to enable three comparisons (1 cm, 4 cm, 8 cm) or to .013 to enable four comparisons (unobstructed 1 cm, 4 cm and 8 cm) between the two groups for each orientation.

Results Thirteen out of the 24 stroke patients recorded one or more fails during the test. In comparison, no fails were recorded by any of the healthy subjects. Stroke subjects did not demonstrate a preference to lead with either the affected limb or the unaffected limb (p > .05). Toe clearance was found to be significantly higher for stroke patients compared to the healthy subjects on the 1 cm high, 8 cm high and the 4 cm wide obstacles (p < .017). Post obstacle distance was significantly reduced in the stroke patients for the three high obstacles and two (4 cm and 8 cm) of the wide obstacles (p < .017). No difference was found between the two groups for the pre-obstacle distance (p > .017). Stroke patients also demonstrated significantly longer pre and post obstacle step times and total step time (p < .017) than the controls, although the proportion of step time prior to the obstacle was not found to be different (p > .017).

Conclusion Higher failure rates and the altered limb trajectory utilised by the stroke subjects demonstrate that obstacle crossing is significantly impaired following stroke. Some changes, such as the increase in toe clearance may reduce the risk of a trip. However, other adaptations, such as the reduced post obstacle distance are likely to threaten gait stability following stroke. Physiotherapists should consider obstacle crossing when assessing and treating stroke subjects with a gait disorder.

References

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