

Targeting interventions: can it be achieved?

Michele Sterling

BPhy, MPhty, Grad Dip Manip Physio, FACP, PhD
Director NHMRC CRE in Road Traffic Injury
Associate Director, Recover Injury Research Centre
Menzies Health Institute Qld, Griffith University
Adjunct Professor, Centre for Advanced Imaging, UQ

Recover is a joint initiative of the Motor Accident Insurance Corporation,
The University of Queensland and Griffith University



The Spine Journal 16 (2010) 1566–1581



NPTT: Treatment & Prognosis of Neck Pain
Is exercise effective for the management of neck pain and associated disorders or whiplash-associated disorders? A systematic review by the Ontario Protocol for Traffic Injury Management (OPTiMa) Collaboration

Danielle Southerst, BScH, DC, FCCS(C)^{a,b}, Margaret C. Nordin, MSc^a,
Pierre Côté, DC, PhD^{a,c}, Heather M. Shearer, DC, MSc, FCCS(C)^a,
Sharanya Varatharajan, BSc, MSc^a, Hainan Yu, MBBS, MSc^a

Overall, most studies reported small effect sizes suggesting that a small clinical effect can be expected with the use of exercise alone



The Spine Journal 16 (2010) 1566–1581



Review Article

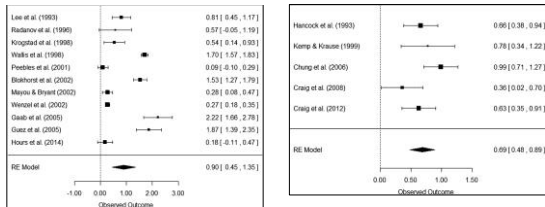
Are psychological interventions effective for the management of neck pain and whiplash-associated disorders? A systematic review by the Ontario Protocol for Traffic Injury Management (OPTiMa) Collaboration

Heather M. Shearer, DC, MSc^{a,b,c}, Linda J. Carroll, PhD^a,
Jessica J. Wong, BSc, DC, FCCS(C)^{a,b}, Pierre Côté, DC, PhD^{a,d,e,f},
Sharanya Varatharajan, BSc, MSc^{a,b}, Danielle Southerst, BScH, DC, FCCS(C)^a,
Deborah A. Sutton, BScOT, MEd, MSc^a, Kristi A. Randhawa, BHSce, MPH^{a,g},
Hainan Yu, MBBS, MSc^a, Silvano A. Mior, DC, PhD^{a,h},
Gabrielle M. van der Velde, DC, PhD^{a,i,j}, Margaret C. Nordin, Dr Med Sci^a,
Maja Stupar, DC, PhD^{a,f}, Anne L. Taylor-Vaisey, MLS^a

We did not find evidence for or against the use of psychological interventions for neck pain or WAD

BMJ Open Psychological impact of injuries sustained in motor vehicle crashes: systematic review and meta-analysis

Ashley Craig,¹ Yvonne Tran,¹ Rebecca Guest,¹ Bamini Gopinath,¹ Jagnoor Jagnoor,¹ Richard A Bryant,² Alex Collic,³ Robyn Tate,¹ Justin Kenardy,⁴ James W Middleton,¹ Ian Cameron¹



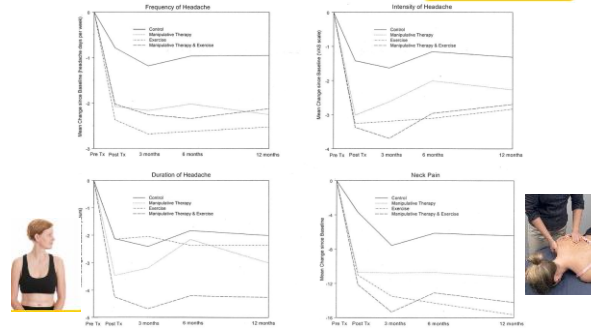
WAD

mTBI: 0.23 (0.05-0.41)

SCI

A Randomized Controlled Trial of Exercise and Manipulative Therapy for Cervicogenic Headache

Gwendolen Jull, PT, PhD,* Patricia Trott, PT, MSc,† Helen Potter, PT, MSc,‡ Guy Zins, PT, Grad Dip Manip Ther,§ Ken Nance, PT, Mph,|| Debra Shirley, PT, BSc,¶ Jonathan Imberger, MSc,|| Ian Mansworth, PhD,|| and Carlen Richardson, PT, PhD,*

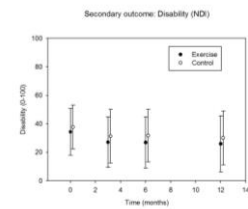
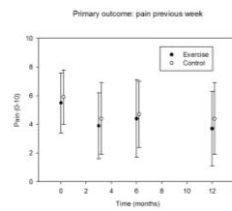
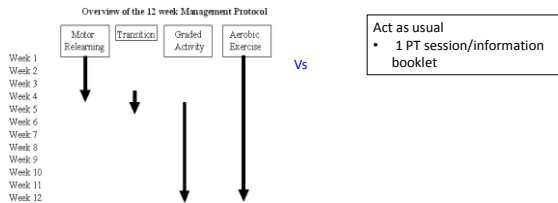


Chronic WAD

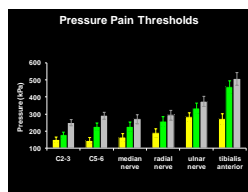
Comprehensive physiotherapy exercise program or advice for chronic whiplash (PROMISE): a pragmatic randomised controlled trial (ACTRN12609000825257)

Michaleff, Maher, Lin, Rebbeck, Jull, Connelly, Sterling

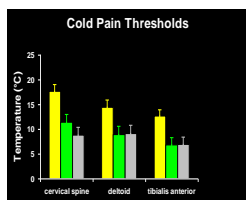
The Lancet (2014)



Different mechanisms seem to underlie different MSK conditions



■ Chronic WAD; NDI 44(12)%
 ■ Chronic Idiopathic; NDI 29(16)%
 ■ Controls

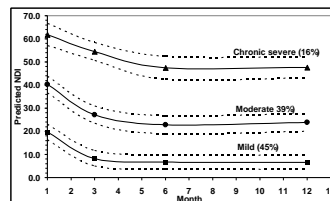


Scoff, Jull, Sterling 2005 Clin J Pain (21):175-181
Elliott et al Clinical Radiology 2008
Chien, Eliav, Sterling 2009 Manual Therapy

RECOVER
 INJURY RESEARCH CENTRE
 RESEARCH • EVIDENCE • REHABILITATION

Recovery Pathways

Predicted disability trajectories & predicted probability of membership (%)



N=155
 Group based trajectory modeling
 2-3 months important

Sterling, Hendrikz, Kenardy 2010 Pain 150:22-28

Recover is a joint initiative of the Motor Accident Insurance Commission, The University of Queensland and Griffith University.



The University of Queensland



Griffith University



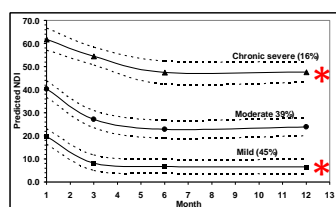
MENDS



MAIC



Motor Accident Insurance Commission



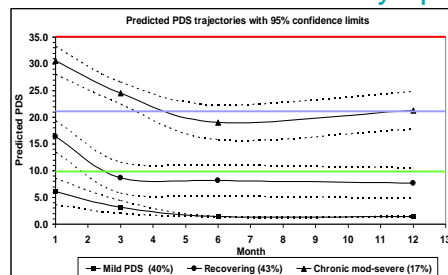
Predictors of Disability Trajectories

Variable	Coeff (SE)	OR (95% CI)	p
Cold Pain TH > 13°C	3.27 (0.85)	26.3 (4.98, 139)	0.0001
Pain (VAS) > 5/10	1.46 (0.27)	4.31 (2.55, 7.28)	0.0001
Age (> 37)	0.103 (0.03)	1.11 (1.04, 1.18)	0.001

Sterling, Hendrikz, Kenardy 2010 Pain 150:22-28

RECOVER
 INJURY RESEARCH CENTRE
 RESEARCH • EVIDENCE • REHABILITATION

Posttraumatic stress symptoms



Severe

Mod/severe

Moderate

Sterling, Hendrikz, Kenardy 2010 Pain 150:22-28

Recover is a joint initiative of the Motor Accident Insurance Commission, The University of Queensland and Griffith University.



The University of Queensland



Griffith University



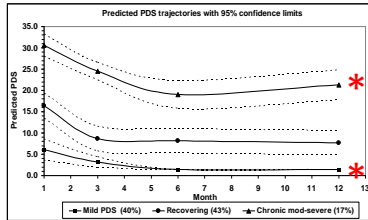
MENDS



MAIC

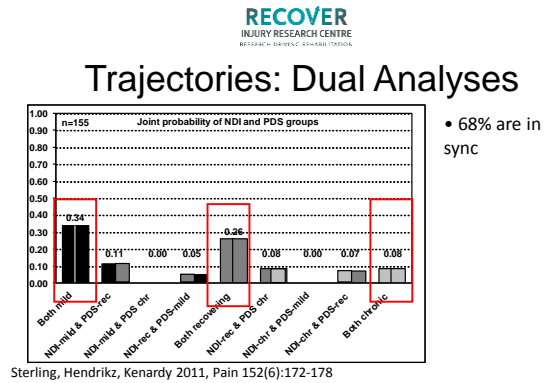


Motor Accident Insurance Commission



Variable	Coeff (SE)	OR (95% CI)	p
Cold Pain TH > 13°C	2.27 (0.75)	9.7 (2.2, 42.4)	0.0027
Pain (VAS) > 5/10	0.76 (0.20)	2.13 (1.43, 3.17)	0.0002
Age	-0.006 (0.03)	0.99 (0.98, 0.99)	0.02
PPT neck >200KPa	-0.01 (0.005)	0.99 (0.98, 1.0)	0.05

Predictors of posttraumatic stress Trajectories



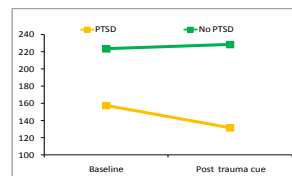
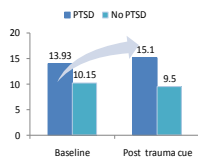
Sterling, Hendrikz, Kenardy 2010 Pain 150:22-28

Recover is a joint initiative of the Motor Accident Insurance Corporation
The University of Queensland and Griffith University.

Recall of traumatic event

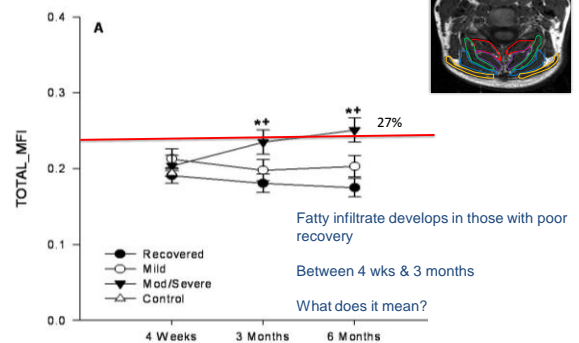


Pressure Pain thresholds

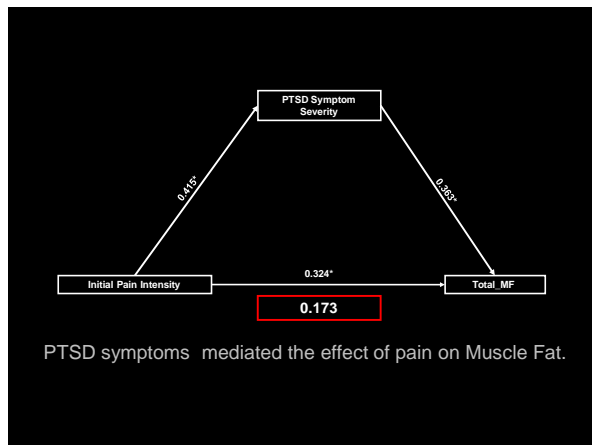


Thermal Pain thresholds

Dunne-Proctor, Kenardy, Sterling Clin J Pain 2015



Elliott, et al., 2011



Inflammation/immune responses

OPEN ACCESS Freely available online

PLOS ONE

The Course of Serum Inflammatory Biomarkers Following Whiplash Injury and Their Relationship to Sensory and Muscle Measures: a Longitudinal Cohort Study

Michele Sterling¹, James M. Elliott², Peter J. Cabot³

	Acute Stage WAD			Chronic Stage WAD (3-6 months)		
Inflammatory marker	Asymptomatic controls n=18	Recovered or Mild WAD 0-28% NDI N=20	Moderate/severe WAD ≥ 30% NDI N=20	Asymptomatic controls	Recovered or Mild WAD 0-28% NDI	Moderate/severe WAD ≥ 30% NDI
TNF-α (pg/ml)	1.07 (0.56)	1.33 (0.88)**	1.13 (0.65)	0.7 (0.13)	1.4 (0.94)**	0.99 (0.7)
IL-1β (pg/ml)	1.1 (0.9)	1.2 (0.27)	1.1 (0.7)	1.1 (0.6)	1.4 (0.8)	1.5 (0.3)
CRP (mg/l)	1.4 (0.25)	2.4 (0.32)*	2.5 (0.34)*	1.0 (0.13)	1.4 (0.37)	3.9 (0.37)**

CRP correlated with:
PPT neck (-0.51); PPT Tib Ant (-0.55) and cold pain threshold (0.42)
TNF negative correlation with muscle fat infiltrate (-0.51)

RECOVER
INJURY RESEARCH CENTRE
RESEARCH. EVIDENCE. REHABILITATION.

Stress Related Responses

Original Investigation

Relationship Between Stressfulness of Claiming for Injury Compensation and Long-term Recovery A Prospective Cohort Study

Genevieve M. Grant, LL.B, PhD; Meaghan L. O'Donnell, PhD; Matthew J. Spittal, PhD; Mark Creamer
David M. Studdert, LL.B, SCD, MPH

JAMA Psychiatry. doi:10.1001/jamapsychiatry.2013.4023
Published online February 12, 2014.

- 34% high levels of stress understanding claim
- 30.4% with claim delays
- 27% with number medico-legal assessment
- 26% with amount of compensation
- Predicted disability:
 - WHODAS (+6.94 pts); HADS (+2.61)
 - Lower QOL – WHODAS (-0.73 pts)

Research is a joint initiative of the New Zealand Accident Compensation Corporation, The University of Queensland and Griffith University.

The University of Queensland

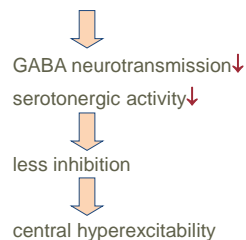
Griffith University

MENZIES

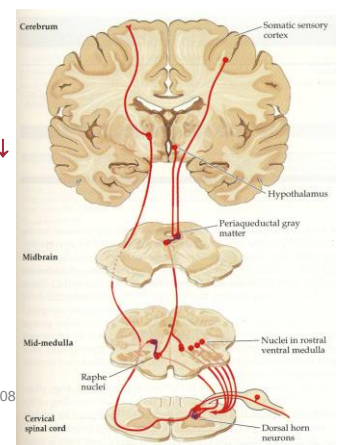
MAIC

Research Centre of Excellence in Injury Prevention and Rehabilitation

severe stress



Suarez-Roca et al. Behav Brain Res 2008



Stress Related Responses

Neurobiological Stress Systems

- Genetic variants which affect noradrenergic system function (COMT) predict vulnerability to acute pain and persistent neck pain following MVC
- Genetic variants that affect glucocorticoid system function (FKBP5) predict chronic pain after MVC

Borstov et al *Neuromolecular Med.* 2014 Mar;16(1):83-93

McLean et al *Journal of Pain* 2011; 12 (1): 83-93

Borstov et al *Pain*. 2013 Aug;154(8):1419-26

Research is a joint initiative of the Motor Accident Insurance Commission, The University of Queensland and Griffith University



ORIGINAL ARTICLE

What information do patients need following a whiplash injury? The perspectives of patients and physiotherapists

Annick Maujean, Joanna Sterling and Michele Sterling

"In your opinion, what is the most relevant information that people with a whiplash injury need to know in the early stages in order to help their recovery? Can you please list five key statements pertaining to any aspect of whiplash injury that you believe are the MOST important".

- 1) General information about whiplash injuries
- 2) Treatment and recovery
- 3) Reassurance
- 4) Provision of poor information and patients' interactions with general practitioners (GPs)
- 5) Maintaining daily activities
- 6) Compensation claims and litigation.

Research is a joint initiative of the Motor Accident Insurance Commission, The University of Queensland and Griffith University



"The degree to which EVERY additional stress interferes with the recovery process & exacerbates both psychological & physical injuries" (Patient 3)

"I was and still am very anxious when driving or being a passenger"

"Doctor's Practice does not take the injury seriously" (Patient 4)

"Feel let down by lawyers and GPs" (Patient 20)

"Medical Practitioner's lack of care" (Patient 5)

N=20; 15 females
49.6 +/- 15 years
Time since injury: 10 +/- 7 months
NDI: 29.3% +/- 21%
NRS: 3.5 +/- 1.8
DASS: within normal ranges for depression & anxiety

ROUNDTABLE

Prognosis After Whiplash Injury

Where to From Here? Discussion Paper 4

Michele Sterling, PT, PhD,* Linda J. Carroll, PhD,† Helge Kasch, MD, PhD,‡ Steven J. Kamper, PT, PhD,§ and Brian Stempes, PhD¶

- Initial pain
- Initial disability
- Cold hyperalgesia
- Neck movement
- Psychological factors
 - PTSD symptoms
 - Recovery expectations
 - Depression
 - Pain catastrophising

Research is a joint initiative of the Motor Accident Insurance Commission, The University of Queensland and Griffith University



Can we predict those who will recover?

- Not well investigated
- Important
 - Patient assurance
 - Too much treatment may be detrimental – treatment iatrogenesis (Cote et al 2007)
 - May need minimal (less intense) treatment
 - Avoid 'medicalisation'

RECOVER

INJURY RESEARCH CENTRE
RESEARCH • EVIDENCE • REHABILITATION

Spine

ROUNDTABLE

SPINE Volume 36, Number 235, pp S330-S334
©2013, Lippincott Williams & Wilkins

Prognosis After Whiplash Injury

Where to From Here? Discussion Paper 4

Michele Sterling, PT, PhD,* Linda J. Carroll, PhD,† Helge Kasch, MD, PhD,‡ Steven J. Kamper, PT, PhD,§ and Brian Stempes, PhD¶

- Initial pain
- Initial disability
- Cold hyperalgesia
- Neck movement
- Psychological factors
 - PTSD symptoms
 - Recovery expectations
 - Depression
 - Pain catastrophising

Research is a joint initiative of the Victorian Accident Insurance Commission, The University of Queensland and Griffith University.

The University of Queensland

Griffith University

MENZIES

MAIC

RECOVER CENTRE FOR WHIPLASH INJURY RESEARCH

Clinical Prediction Rule

- 2 Prospective, longitudinal studies,
- Outcome: 12 month NDI n=262
- Included variables
 - Disability: NDI
 - Pain: VAS
 - Neck ROM
 - Hyper-arousal symptoms (PDS)
 - Cold pain threshold
 - age
 - gender
 - presence of headaches



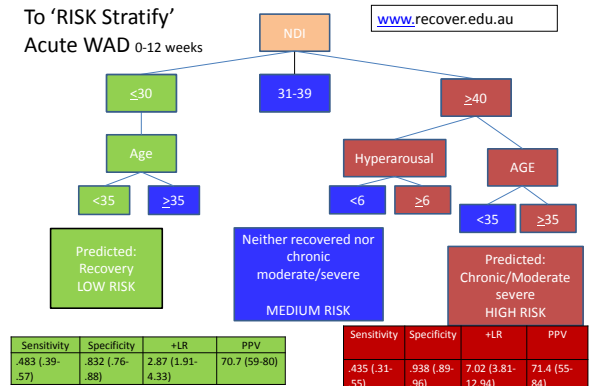
- Simple
- Efficient
- Quick
- Use by GPs, Physios, Primary care

Ritchie, Sterling et al. Pain (2013): 154: 2198-2206

WHIPLASH CPR To 'RISK Stratify' Acute WAD 0-12 weeks

Ritchie, Sterling et al. Pain (2013): 154: 2198-2206

www.recover.edu.au



What the CPR is and what it isn't

- It is a screening tool only
- It should be used to 'risk stratify' patients only.
- It is not a replacement for clinical assessment
- It provides some information about the type of treatment required but it does not direct treatment
- It is not a replacement for clinical reasoning

Recover is a joint venture of the three Academic Institutions, the University of Queensland and the University of

The University of Queensland

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

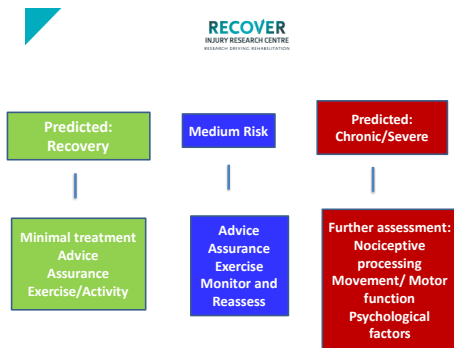
MAIC

MAIC

- PDS
- 3 subscales:
 - Intrusive thoughts
 - Avoidance
 - **hyper-arousal**

Having trouble falling or staying asleep	0 1 2 3
Feeling irritable or having fits of anger	0 1 2 3
Having trouble concentrating	0 1 2 3
Being overly alert	0 1 2 3
Being jumpy or easily startled	0 1 2 3

0: Not at all or only one time
 1: once a week or less/ once in a while
 2: 2 to 4 times a week / half of the time
 3: 5 or more times a week / almost always



Ritchie, Hendrikz, Kenardy, Sterling . Pain (2013): 154: 2198-2206

Recover is a joint venture of the three Academic Institutions, the University of Queensland and the University of

The University of Queensland

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

MAIC

- Current treatment approaches have only modest effects - *is this so unexpected?*
- May be effective in some - ? *who are they*
- Risk stratification in the early stage – first step
- May need to include additional interventions that target risk factors (*high risk group in acute stage*)
 - Pain modulation processes
 - Psychological factors – *eg PTSD and others*
 - Neuro-immune responses
 - Environmental/system & social processes
- Risk factors not necessarily causal

StressModEx – Physiotherapist-led Stress Inoculation Training integrated with exercise for acute whiplash injury: study protocol for a randomised controlled trial

Carrie Ritchie^a, Justin Kenardy^b, Rob Smeets^c, Michele Sterling^a

Journal of Consulting and Clinical Psychology
1996, Vol. 64, No. 2, 408–410

Copyright © 1996 by the American Psychological Association, Inc.
0893-3200/96/060408-10

Effects of Stress Inoculation Training on Athletes' Postsurgical Pain and Rehabilitation After Orthopedic Injury

Michael J. Ross
St. Louis University

R. Scott Berger
MEDCO Behavioral Systems

Interventions

- SIT + physiotherapy exercise
- Physiotherapy exercise alone

Week	Sessions/week	SIT and Physiotherapy Exercise	Physiotherapy Exercise
1	2	Session 1: Intro to SIT, Physiotherapy Exercise Session 1b: Physiotherapy Exercise	Session 1: Physiotherapy Exercise Session 1b: Physiotherapy Exercise
2	2	Session 2: SIT/Physiotherapy Exercise Session 2b: Physiotherapy Exercise	Session 2: Physiotherapy Exercise. Session 2b: Physiotherapy Exercise.
3	2	Session 3: SIT/Physiotherapy Exercise. Session 3b: Physiotherapy Exercise	Session 3: Physiotherapy Exercise Session 3b: Physiotherapy Exercise
4	2	Session 4: SIT/Physiotherapy Exercise. Session 4b: Physiotherapy Exercise	Session 4: Physiotherapy Exercise Session 4b: Physiotherapy Exercise
5	1	Session 5: SIT/Physiotherapy Exercise	Session 5: Physiotherapy Exercise
6	1	Session 6: SIT/Physiotherapy Exercise	Session 6: Physiotherapy Exercise

SIT + Physiotherapy Exercise

Stress Inoculation Training:

3 phases

Identifying and understanding stress

- Education about the influence of stress on nociception/pain
- What thoughts, feeling, actions have you noticed increase or decrease your whiplash pain?

Developing skills

- Relaxation
- Problem solving
- Helpful coping self statements

Applying skills in various stressful situations

- Identify specific stressor
- Prepare for stress
- Plan into action and review
- Cannot move all anxiety, just keep it manageable



Preliminary Results

- Intervention is acceptable to patients and physiotherapists
 - Credibility/expectancy questionnaire
 - Physios (n=11) ranked credibility as 20±2
 - Patients (n=57) ranked credibility as 19.6±2.5/10
- Physiotherapists can successfully deliver the intervention
 - Audit of recorded sessions by clinical psych
 - 2 day training + accreditation
 - Random follow-up audits

http://www.griffith.edu.au/health/centre-research-excellence-road-traffic-injury/pregabalin-study

History | Ideal Body Fat Percent | Determining Your Risk | Scholarometer for Ch | Altimetric IT | Your 14-Step Guide to | 4 Swim Sets For 70.3

myGriffith | Staff portal | Contact us | Search our site

Griffith UNIVERSITY

Study | International | Research | Industry | Alumni | About Griffith | Staff

Home > Health > Centre of Research Excellence in Recovery Following Road Traffic Injuries > Pregabalin study

Pregabalin study

Centre of Research Excellence in Recovery Following Road Traffic Injuries

- Project
- Team
- Aim
- Advisory Groups
- Staff
- Whiplash Evidence-based Resource
- (Pregabalin study)
 - (Study Process)
 - (Study Overview)
 - (Investigators)
- Whiplash Injury Recovery - self-help guide

CAN PREGABALIN PREVENT CHRONIC PAIN AFTER WHIPLASH INJURY - A RANDOMISED CONTROLLED TRIAL

Can pregabalin, if given early in acute whiplash, prevent the chronic pain that can develop after a whiplash injury?

Summary

The study is a double blind, randomised, placebo-controlled trial comparing pregabalin and advice (intervention) to placebo and advice (control) for patients with acute whiplash injury. Pregabalin or placebo will commence at 75 mg bd and be titrated up to 300 mg bd according to usual practice. Intervention will commence as soon as possible but within 12 hours of injury and continue for 5 weeks. A booklet containing advice will be given to all participants. Results of the intervention will be supplemented by an economic evaluation of the direct and indirect costs incurred by both the pregabalin + advice participants and those receiving placebo + advice. A more detailed study overview can be found [here](#).



Whiplash ImPaCT Study Recruitment

Get INVOLVED!

- Acute WAD (<4 weeks post MVA); 18 to 65 years old
- No known or suspected serious spinal pathology
- No confirmed fracture or dislocation at time of injury

\$99 honorarium per participant successfully recruited into the trial

To refer:



physio.whiplashimpact@sydney.edu.au (NSW/ACT)

whiplash@griffith.edu.au (QLD)



www.facebook.com/WhiplashImpact/

Trial Protocol <http://dx.doi.org/10.1016/j.jipphys.2016.02.006>



Page 38



Australian Government
Australian Research Council



Physiotherapy
Research
Foundation



Australian Government
National Health and Medical Research Council

