



Institute of Actuaries of Australia

Whiplash claimants health outcomes and cost pre and post the 1999 NSW CTP legislative reforms

**Prepared by Sarah Johnson, Marnie Higlett, John Walsh,
Anne-Marie Feyer, Ian Cameron and Trudy Rebbeck**

Presented to the Institute of Actuaries of Australia
XIth Accident Compensation Seminar 1-4 April 2007
Grand Hyatt Melbourne, Australia

*This paper has been prepared for the Institute of Actuaries of Australia's (Institute) XIth Accident Compensation Seminar 2007.
The Institute Council wishes it to be understood that opinions put forward herein are not necessarily those of the Institute and the Council is not responsible for those opinions.*

© PricewaterhouseCoopers 2007

The Institute will ensure that all reproductions of the paper acknowledge the Author/s as the author/s, and include the above copyright statement:

The Institute of Actuaries of Australia
Level 7 Challis House 4 Martin Place
Sydney NSW Australia 2000
Telephone: +61 2 9233 3466 Facsimile: +61 2 9233 3446
Email: actuaries@actuaries.asn.au Website: www.actuaries.asn.au

Tables of contents

Tables of contents	2
1 Introduction	4
2 Key findings	7
3 Methodology	9
4 Results	20
5 Acknowledgements	39

Abstract

The change in Compulsory Third Party Motor Vehicle Accidents insurance legislation in New South Wales in 1999 provided an opportunity to assess the long term health outcomes and cost for people with Whiplash Associated Disorders (WAD) before and after legislative change. The legislative change included the effective removal of financial compensation for 'pain and suffering' for minor claims, earlier acceptance of compensation claims and access to early treatment.

This paper examines the health outcomes of people with WAD and the cost-effectiveness of the Scheme in relation to the health outcomes being achieved. The primary hypothesis was that people sustaining whiplash injuries after the change in legislation would have reduced long term disability and improved quality of life compared with a group sustaining these injuries prior to the changes. A further hypothesis was that the pattern of costs would change to reflect earlier access to treatment and that improved recovery, along with removal of non economic loss payments and reduced legal fees, would lead to reduced costs.

Study participants were segregated into three cohorts; those who reported WAD injuries during a specified period in 1999 (pre legislative change), 2001 (soon after legislative change) and 2003 (several years after legislative change). Health outcomes were measured using the Functional Ratings Index (FRI), the Medical Outcomes Study Short Form 36 (SF-36) and the Core Whiplash Outcome Measure (CWOM).

Results indicate that participants who reported WAD after the legislative changes had better health outcomes than those who reported WAD prior to the changes. Scores on the FRI indicate that the 2001 and 2003 cohort participants reported significantly less disability than the 1999 cohort two years post injury as well as significantly less pain. Similarly, physical health related quality of life was higher for the 2001 and 2003 cohorts (as measured by the SF-36); however, there was no significant difference in mental health related quality of life. The proportion of participants who were recovered at two years post injury was significantly greater for the 2001 and 2003 cohorts when compared to the 1999 cohort (as measured by the CWOM).

The analysis on the cost of WAD claims indicated that medical payments were higher in the first six months post injury (and thus there was earlier access to treatment) and that the average cost of WAD claims was lower post the legislative change.

Overall this study has shown a significant improvement in disability, pain and physical functioning after legislative change. In addition to improved health outcomes the cost of WAD claims were also reduced. Design of compensation schemes should be undertaken with the understanding that the structure of the scheme may have substantial effects on the long term health of those suffering WAD injuries.

Key words: *whiplash, whiplash associated disorder, NSW CTP, legislative reforms, health outcomes*

1 Introduction

Background to the study

The change in Compulsory Third Party (CTP) Motor Vehicle Accidents insurance legislation in New South Wales (NSW) in 1999 provided an opportunity to assess the long term health outcomes and cost for people with Whiplash Associated Disorders (WAD) before and after legislative change.

The research project presented in this paper examines the health outcomes of people with WAD and the cost-effectiveness of the NSW CTP Scheme (“the Scheme”) in relation to the health outcomes being achieved. The remainder of this introduction outlines the key changes made to the Scheme, the objectives and the hypotheses of the project.

Following the introduction, this paper presents the key findings of the project along with the methodological approach and full analyses.

WAD and key changes made to the Scheme

WAD claims are a significant component of the Scheme. WAD has had the highest claim frequency of any injury type in the Scheme since its inception (July 1989), with just under 40% of all claims involving some form of whiplash injuryⁱ. The cost of such claims contributes around 25% to the total cost of claimsⁱⁱ.

The key changes made to the Scheme in 1999 and the subsequent few years wereⁱⁱⁱ:

- ‘A new threshold for access to non-economic loss (pain and suffering) damages. To be eligible to claim non-economic loss damages CTP claimants must now have an impairment greater than 10%. There were no changes to medical and treatment costs. They continue to be met on a ‘reasonable and necessary’ basis.
- An early notification and treatment process was designed to allow claimants to obtain early treatment without need for assessment of disability. This was particularly aimed at claimants with soft tissue injuries such as a WAD.
- Decision within 3 months on whether the insurer will admit liability on the CTP claim.
- The development of guidelines for the rehabilitation or treatment of injured claimants. In 2002 the MAA released guidelines on the clinical management of whiplash injuries. An education program accompanied the release of these guidelines.
- A new service to resolve disputes about the claimant’s impairment level and what is reasonable and necessary treatment and rehabilitation. This service is independent of insurers and claimants.
- A new process for settling claims. All disputed claims must go to this new service – the Claims Assessment and Resolution Service (CARS). There is no access to court unless the matter has been through CARS. If CARS assesses the claim the decision is binding on the insurer.
- Legal costs for motor accident matters are fixed by regulation unless the claimant and the solicitor contract out of these fees’.

Objectives

The objectives of the study were as follows:

- 1 To determine the effect of the removal of non-economic loss damages for claimants with a whiplash injury on health outcomes.
- 2 To determine the elements of the compensation process (i.e. the actions within direct control of the MAA or insurers) that are associated with good and bad outcomes, including but not limited to:
 - (a) time to admit liability
 - (b) payment as a lump sum or periodic payment
 - (c) early notification
 - (d) treatment system
 - (e) release of clinical guidelines.
- 3 To determine the cost-effectiveness of the Scheme in relation to the health outcomes currently being achieved.

Hypotheses

Hypothesis 1 (null hypothesis)

The health outcomes of people with a whiplash injury before the enactment of the Motor Vehicle Accident Compensation Act (1999) and the release of the accompanying clinical guidelines are the same as those for people injured after legislative change.

Sub hypotheses

- That the early notification has a positive effect on health outcomes for people with whiplash injuries
- That the facilitation of early access to treatment through the acceptance of provisional liability has a positive effect on health outcomes for people with whiplash injuries.
- That the earlier acceptance of liability by insurers has a positive effect on health outcomes for people with whiplash injuries.
- That the changes to dispute resolution have a positive effect on health outcomes for people with whiplash injuries.
- That the additional information (guidelines for consumers) provided to claimants has a positive effect on health outcomes for people with whiplash injuries.

Hypothesis 2 (null hypothesis)

The cost-effectiveness, expressed as cost per good health outcome, for people with a whiplash injury before the enactment of the Motor Vehicle Accident Compensation Act (1999) are the same as those for people injured after legislative change.

Sub hypotheses

- That the medical expenses for claims for whiplash injury after the enactment of the Motor Vehicle Compensation Act (1999) are higher and associated with an improvement in health outcomes.
- That the economic losses for claims for whiplash injury after the enactment of the Motor Vehicle Compensation Action (1999) are lower but not associated with a decline in health outcomes.
- That the non-economic losses for claims for whiplash injury after the enactment of the Motor Vehicle Compensation Act (1999) are lower but not associated with a decline in health outcomes.

2 Key findings

Overall this project demonstrated that the health outcomes of claimants with WAD improved and that the average cost of a WAD injury was lower (and hence there were savings to the Scheme) after the legislative change compared with before the legislative change.

The analysis was based on the comparison of three cohorts, these being:

- the 1999 cohort (around the time of legislative change)
- the 2001 cohort (shortly after legislative changes)
- the 2003 cohort (several years after legislative changes).

Further details on these cohorts are contained in section 3.

Three separate pieces of analysis were conducted (in line with project hypotheses). These were:

- Long term health outcomes pre and post legislative change. This analysis examines the health outcomes of the 1999, 2001 and 2003 cohorts at 2 years post injury.
- Prospective health outcomes following WAD. This analysis examines the health outcomes for the 2001 and 2003 cohort at 3 months, 6 months and 2 years post injury. (Note, this analysis does not examine health outcomes pre the legislative change but rather aims to examine whether health outcomes were maintained, amplified or reduced several years after legislative change).
- Cost outcomes. This analysis examines the cost-effectiveness of people with a WAD before and after the enactment of the Motor Vehicle Accident Compensation Act (1999).

The key findings for each of these analyses are presented below.

Long term health outcomes pre and post legislative change

The key findings from this analysis were as follows:

- After change in legislation, designed to reduce compensation and to encourage early treatment, recovery from whiplash improved.
- The legislative change had a beneficial effect on disability, pain, and global recovery.
- Health outcomes for people with whiplash injuries improved after legislative change. With this in mind:
 - Compensation schemes should be carefully designed to support recovery and minimise adverse health effects
 - Design of compensation schemes should be undertaken with the understanding that the scheme structure may have substantial effects on the long term health of injured people.

Prospective health outcomes following WAD

The key findings from this analysis were as follows:

- For the 2001 cohort pain, disability and physical functioning improved over time, however, mental health status did not. For the 2003 cohort pain, disability, physical functioning and mental health status improved over time.
- On some measures, health outcomes were better for the 2003 cohort compared to the 2001 cohort. Factors such as the implementation of clinical guidelines with insurers and treating health care practitioners, which may have resulted in improved claims and practitioner management of whiplash, along with the wider influence of evidence based practice across musculoskeletal health care is known to contribute to improved health outcomes in general.
- Whiplash injury had a large effect on the health of the 2001 and 2003 cohorts with only 50% recovered at 2 years. Non-recovery was highly associated with initial levels of disability. Identifying these non-recoverers, and directing appropriate management to this group would therefore be the next step in improving health outcomes for people with WAD.

Cost outcomes

The key findings from this analysis were as follows:

- The pattern of costs changed to reflect the intention of the legislative changes, namely earlier access to treatment, reduced legal fees and reduced non-economic loss payments.
- Small claims finalised faster after the introduction of the new legislation.
- The legislative changes were also effective in reducing the average claim size of the smaller claims that finalise relatively quickly, yielding substantial savings to the scheme due to their high frequency.
- On the other hand, for large slow to finalise claims (which are not as common) there was evidence of higher payments after the legislative change where restrictions on payments did not exist. That is, for these large claims, there were higher medical and economic loss payments after the legislative change.

The method and full results of the above analyses are discussed below.

3 Methodology

Health outcomes analysis

To address the objectives and hypotheses, telephone interviews were conducted with a sample of people who suffered WAD as a result of a motor vehicle accident. Three cohorts were created: those who experienced a WAD in:

- 1999 (around the time of legislative change)
- 2001 (shortly after legislative changes)
- 2003 (several years after legislative changes).

The sections below outline the cohorts interviewed, the interview process and the interview tool.

Cohort design, interview timings, sample size and the interview questionnaire

As outlined above, in order to examine the full impact of the 1999 legislative changes, the methodology was based on setting up three cohorts of WAD claimants. These cohorts and their purpose in the analysis are outlined in Table 1 below.

Table 1 Description of WAD cohorts

Cohort	Date of accident	Purpose of cohort in the analysis
1999	1 July 1999 – 30 September 1999	To obtain baseline data prior to legislative changes. This cohort determines the comparison points for the rest of the study.
2001	1 July 2001 – 15 December 2001	To examine outcomes soon after the legislation commenced.
2003	1 July 2003 – 19 March 2004 ^{iv}	To examine outcomes when the legislation is established, particularly the new dispute resolution processes, and when the guidelines should have been taken up.

Each cohort was interviewed approximately two years after their date of injury. The 2001 and 2003 cohorts were also interviewed at three months and six months post injury (see Table 2).

Table 2 Interview schedules for each cohort

Interviews (post injury)			
Cohort	3 month interview period	6 month interview period	2 year interview period
1999	N/A	N/A	25 October 2001 – 2 May 2002
2001	16 November 2001 – 6 May 2002	22 February 2002 – 30 August 2002	9 October 2003 – 19 December 2003
2003	17 November 2003 – 30 May 2004	8 March 2004 – 30 September 2004	27 September 2005 – 3 March 2006

Whiplash claimants health outcomes and cost pre and post the 1999 NSW CTP legislative reforms

A calculation of power was made. The calculation was based on the assumption that the average functional rating scale declines from a mean of 20 at 3 months to a mean of:

- 16 at one year with a standard deviation of 8.
- 8 at 2 years with a standard deviation of 6.

Based on these assumptions a sample of 150 would have an 80% chance of detecting the expected changes to health outcomes at two years. As a result, it was agreed that each cohort interviewed would have a sample of at least 150.

Figure 1 below outlines the number of people reporting WAD during each of the specified time periods (the WAD population) and the number of people who participated in the study for each cohort at each interview period (the sample).

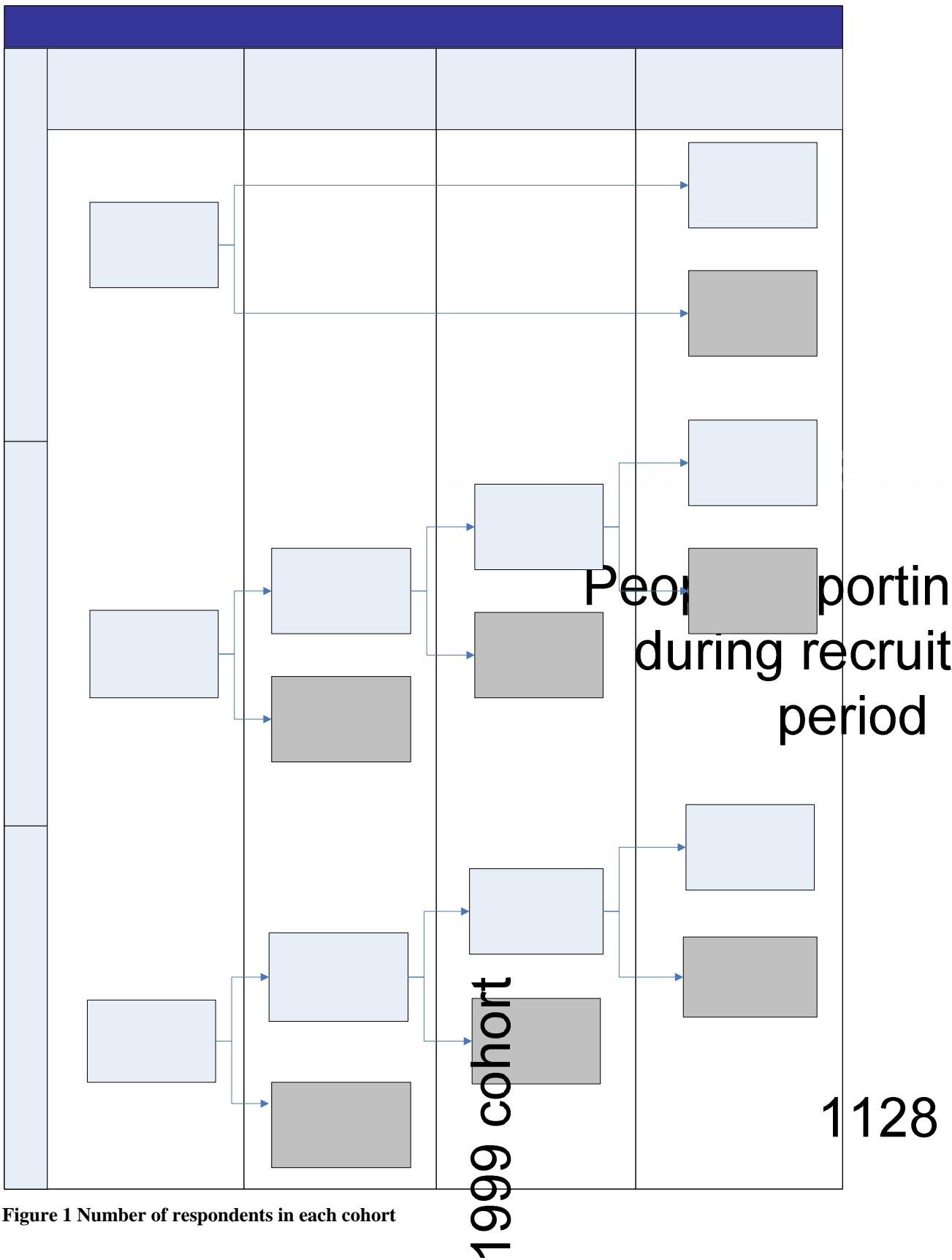


Figure 1 Number of respondents in each cohort

The interview process and questionnaire

The interview process excluded participants with any of the following characteristics:

- under 18 years of age
- non-English speakers
- bicyclists and pedestrians
- claimants with concurrent serious injuries (e.g. long bone fractures and spinal injuries).

The interview tool comprised of questions relating to:

- demographic characteristics
- injury severity and treatment received
- familiarity with the Whiplash Guidelines
- health outcomes (CWOM, FRI, SF-36)

Questions relating to health outcomes were taken from the standardised tools outlined below.

Whiplash claimants health outcomes and cost pre and post the 1999 NSW CTP legislative reforms

Table 3 Health outcome measures

Health outcome tool	Number of items	Dimensions measured	Scoring	Reliability and validity
SF-36 Medical Outcomes Study Short Form 36	36	<ul style="list-style-type: none"> • A multi-purpose short-form health survey measuring an eight scale profile of scores as well as evaluating physical and mental health. • Comparative to Australian normative data^v. 	0-100 (lower scores indicating poorer health)	High reliability and validity and demonstrated clinical utility ^{vi}
FRI Functional Rating Index	10	<ul style="list-style-type: none"> • Combines the concepts of the Oswestry low back disability questionnaire and the Neck Disability Index. • Quantifies state of pain and dysfunction of the spinal musculoskeletal system. 	0-100 (scores ≤ 25 indicating recovery)	High reliability and validity and demonstrated clinical utility ^{vii}
CWOM Core Whiplash Outcome Measure	6	<ul style="list-style-type: none"> • Measures pain, function, well-being, disability (work and social) and satisfaction with care^{viii}. 	-5 to +5 (higher scores indicating greater recovery)	High validity and responsiveness demonstrated ^{ix}

Characteristics of respondents

The demographic characteristics of respondents in each cohort are presented in Table 4 below. The majority of respondents in each cohort were female, approximately 80% of respondents in each cohort were the driver of the vehicle and the majority were employed. The mean age of respondents was between 36 and 42 years for each cohort.

While almost half (47.3%) of the respondents in the 1999 cohort had an economic loss claim, this was significantly reduced for the 2001 and 2003 cohorts (15.6% and 16.1% respectively). Similarly, there were more respondents in the 1999 cohort who reported a prior claim (13.3%) when compared with the later cohorts (5.4% for the 2001 cohort and 7.0% for the 2003 cohort).

Score on the Index of Relative Socioeconomic Disadvantage (IRSD) were similar for each cohort. Higher scores indicate less socioeconomic disadvantage.

Table 4 Demographic characteristics of respondents

	1999	2001	2003
Female	71.5%	67.3%	74.2%
Driver	80.0%	80.3%	81.9%
Employed	76.4%	64.1%	71.1%
Age in years (mean, SE)	36.8 (1.0)	38.8 (1.1)	41.4 (1.1)
Economic loss claim	47.3%	15.6%	16.1%
Prior claim	13.3%	5.4%	7.0%
IRSD^x (mean, SE)	1002.1 (5.9)	1005.2 (6.0)	1004.3 (6.0)

Characteristics of non-respondents

There were few differences of substance in the characteristics of non-respondents when compared with respondents. The statistical differences between respondents and non-respondents for each cohort are presented in Table 5 below.

Respondents from the 1999 cohort were more likely to be female, the driver of the vehicle, employed and have a higher IRSD score than non-respondents. Respondents from the 2001 cohort were statistically less likely to have an economic loss claim or a prior claim. The 2003 cohort respondents were more likely to be female and not have an economic loss claim when compared with non-respondents who made a WAD claim during the same period.

These differences are in line with expectations for survey participation. That is, people were more likely to participate if they were female, employed and from more socio-economically advantaged backgrounds. For the current study, it is not surprising that people were less likely to respond if they had an economic loss claim. While more respondents were the driver of the vehicle, there was only a trend towards significance (0.04). Therefore, the respondent sample is likely to be representative of the WAD population.

Table 5 Significantly different demographic characteristics of respondents and non-respondents

Cohort	Characteristic	Respondent	Non-respondent	p-value
1999	Female	71.5%	59.3%	0.003
	Driver	80.0%	72.1%	0.04
	Employed	76.4%	64.6%	0.003
	IRSD (mean, SE)	1002.1 (5.9)	987.5 (2.5)	0.03
2001	Economic loss claim	15.6%	27.9%	0.002
	Prior claim	5.4%	12.8%	0.01
2003	Female	74.2%	63.5%	0.004
	Economic loss claim	16.1%	26.8%	0.001

Cost outcome analysis

This section discusses the background and methodology to the cost analysis.

Background

The Motor Vehicle Accident Compensation Act (1999) introduced the following reforms aimed at improving the cost-effectiveness of whiplash claims:

- a new threshold for non-economic loss damages (whole person impairment must be greater than 10% for any non-economic loss damages to be paid)
- an early notification and treatment process (administered through the accident notification (ANF) form) to allow claimants to obtain early treatment without need for assessment of disability
- fixed legal costs for motor accident matters unless solicitor and claimant contract out these fees.

In order to examine the cost-effectiveness of these reforms 3 WAD claimant cohorts were analysed. These were:

- the 1999 cohort (around the time of legislative change)
- the 2001 cohort (shortly after legislative changes)
- the 2003 cohort (several years after legislative changes).

The details of these cohorts were discussed in section 3.

For the purpose of this cost analysis *all* people reporting WAD during the recruitment period were analysed and not just the surveyed participants. (Figure 1 details the participant numbers by cohort). The data used in this analysis were provided by the MAA and are at 30 June 2006.

Whiplash claimants health outcomes and cost pre and post the 1999 NSW CTP legislative reforms

Comparing claims experience before and after the introduction of the Motor Vehicle Accident Compensation Act (1999) presented 2 key issues. These were:

- The introduction of the ANF (as distinct from a personal injury claim form). This resulted in claims under the new legislation being classified as either:
 - an ANF only claim
 - a converted claim, that is an incident that originated with an ANF and that for which a personal injury claim form was completed
 - a direct claim, that is where only a personal injury claim form was completed.

It was determined for the purpose of this analysis (comparison of claims pre and post legislative change) that ANF only claims *should* be included in the analysis. The justification of including ANF only claims is discussed later in this section.

- A change in the severity mix of WAD claims before and after the introduction of the Act. As a percentage of all WAD claims, a higher proportion of severity 1 claims (as measured by the maximum abbreviated injury score) were evident in the 1999 cohort when compared to the 2001 and 2003 cohorts.

As a consequence of these two issues the results are presented including ANF only claims and where necessary by both:

- all claims (including ANF only claims)
- all severity 1 claims (including ANF only claims).

The following two sections discuss the reasons for including ANF only claims and presenting the results for severity 1 claims only where necessary.

Inclusion of ANF only claims

ANF only claims were included in this analysis. The reasons for including ANF only claims in the analysis were as follows:

- The claim frequency has fallen steeply without the inclusion of the ANF only claims. The fall in claim frequency still exists when the ANF only claims are included; however, the fall in frequency is more realistic.
- The severity distribution (based on the maximum abbreviated injury score) is more comparable when the ANF only claims are included (and classified as severity 1 claims).
- People with minor injuries who previously made a full claim now only require an ANF to receive compensation for their injuries and the matter finalises at that level.

More detail on the claim frequency and claim severity is discussed below.

Claim frequency

Overall claim frequency has been declining in the Scheme and this is also true of WAD claims. Figure 2 indicates the extent to which the claim frequency has declined.

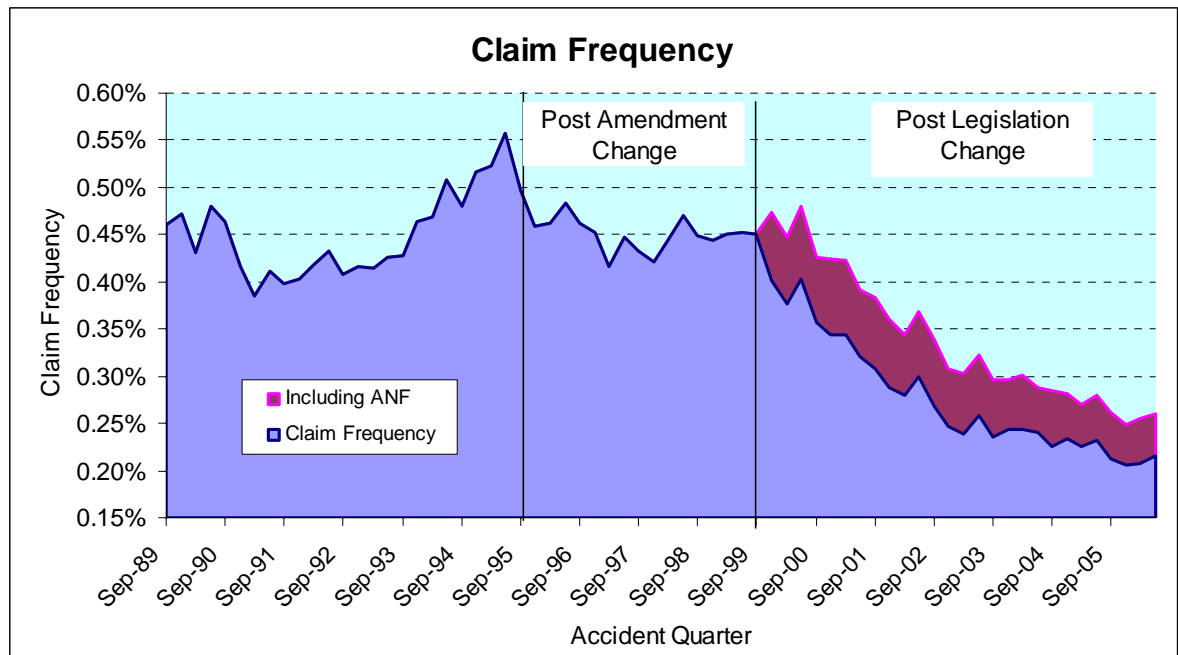


Figure 2 Claim frequency at 30 June 2006 (including incurred claims that have not been reported)

Figure 2 indicates a steady decline in claim frequency after the introduction of the Motor Vehicle Accident Compensation Act (1999). The decline from September 1999 to September 2001 was largely driven by a decrease in the propensity to claim and the decline from September 2001 to September 2005 was largely driven by a decrease in the casualty rate.

It should be noted that the decline in claim frequency is still evident when ANF only claims were included. This contributes to the argument that ANF only claims would have been claims before the introduction of the Motor Vehicle Accident Compensation Act (1999).

Claim severity

In addition to the change in claim frequency, there was an increase in the severity of reported whiplash claims (excluding ANF only claims) in the 2001 and 2003 cohorts when compared to the 1999 cohort. Table 6 presents the proportion of claims by severity (measured by the Maximum Abbreviated Injury Score) and cohort *without* the ANF only claims.

Table 6 Whiplash claims (excluding ANF only claims) by severity

	1	2	3	4	5	6	9	Total
1999	92.3%	6.6%	0.9%	0.1%	0.0%	0.1%	0.0%	100.0%
2001	83.9%	13.8%	1.8%	0.0%	0.0%	0.0%	0.5%	100.0%
2003	87.0%	10.2%	2.2%	0.1%	0.0%	0.0%	0.4%	100.0%

Whiplash claimants health outcomes and cost pre and post the 1999 NSW CTP legislative reforms

Table 6 indicates that a higher proportion of whiplash claims were graded as severity 2 or 3 in the 2001 and 2003 cohorts when compared to the 1999 cohort. The whiplash injury is always coded as severity 1 and hence for claims to be coded a higher severity other more severe injuries must be present.

Table 7 presents the same information as Table 6 but *with* the ANF only claims included (assuming these claims are severity 1 claims).

Table 7 Whiplash claims (including ANF only claims) by severity

	1	2	3	4	5	6	9	Total
1999	92.3%	6.6%	0.9%	0.1%	0.0%	0.1%	0.0%	100.0%
2001	88.3%	10.1%	1.3%	0.0%	0.0%	0.0%	0.4%	100.0%
2003	91.1%	7.0%	1.5%	0.1%	0.0%	0.0%	0.3%	100.0%

The severity distribution is similar by cohort when the ANF only claims were included. This enhances the argument that ANF only claims would have been claims before the legislative change.

Discussions with the MAA indicated that coding practices did not change over this period of time. There was a reduction in missing values over the period but this is unlikely to affect the above results.

The differences in the severity were more pronounced when the maximum abbreviated injury scores were compared by finalisation bands. Table 8 presents the distribution of severity scores between the 1999 and 2001 cohorts.

Table 8 Severity (maximum abbreviated injury score) by finalisation band and cohort (ANF only claims included)

Cohort		1999										
Severity		0-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%	Total
1		99.1%	99.1%	96.5%	95.6%	94.6%	91.9%	89.5%	83.2%	88.4%	85.7%	92.3%
2		0.9%	0.9%	2.7%	4.4%	4.5%	8.1%	8.8%	15.9%	8.9%	10.7%	6.6%
3		0.0%	0.0%	0.9%	0.0%	0.9%	0.0%	1.8%	0.9%	1.8%	2.7%	0.9%
4		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.9%	0.0%	0.1%
5		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
6		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.9%	0.1%
9		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Cohort		2001										
Severity		0-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%	Total
1		100.0%	100.0%	97.6%	96.5%	90.7%	94.1%	88.4%	82.4%	61.6%	71.8%	88.3%
2		0.0%	0.0%	2.4%	2.3%	9.3%	2.4%	9.3%	16.5%	34.9%	23.5%	10.1%
3		0.0%	0.0%	0.0%	0.0%	0.0%	3.5%	1.2%	0.0%	3.5%	4.7%	1.3%
4		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
6		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
9		0.0%	0.0%	0.0%	1.2%	0.0%	0.0%	1.2%	1.2%	0.0%	0.0%	0.4%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

The severity distribution between the 1999 and 2001 cohorts was similar for the first 80% of finalised claims, but the 2001 cohort was more severe than the 1999 cohort in the 80-90% and 90-100% bands.

For the above reasons ANF only claims were included in the analysis and the results are presented for all claims (regardless of severity) and for severity 1 claims only where necessary (to adjust for the change in the severity mix of claims).

Method

This section details the methodology and results of the analysis undertaken to determine the cost-effectiveness of the Motor Vehicle Accident Compensation Act (1999). Specifically the following analyses were undertaken:

- examination of the finalisation patterns within each cohort
- analysis of the average claim size for whiplash claims by cohort (both the overall average claim size was considered and each head of damage – specifically medical, legal, economic loss, non-economic loss and other)
- analysis of the average claim size of whiplash claims by finalisation band and cohort (claims were grouped depending on the time taken for them to finalise, for example, the first 10% of claims finalised were grouped together, then the next 10% of claims finalised were grouped together, etc)
- analysis of the medical payment pattern since the time of accident.

The finalisation pattern analysis was used to determine whether claims were finalising more quickly after the change in legislation. The average claim size analysis was used to determine the effectiveness of the limits on non-economic loss and legal payments as well as to assess whether overall savings to the scheme are likely as a result of the new legislation. The medical payment pattern analysis was used to determine whether earlier access to treatment was evident.

4 Results

Health outcomes analysis

The results of the health outcomes analysis are presented in two sections, these being:

- Long term health outcomes pre and post legislative change. This analysis examines the health outcomes of the 1999, 2001 and 2003 cohorts at 2 years post injury.
- Prospective health outcomes following WAD. This analysis examines the health outcomes for the 2001 and 2003 cohorts at 3 months, 6 months and 2 years post injury.

Long term health outcomes pre and post legislative change

This section presents the detailed results of the analysis on long term health outcomes pre and post the legislative change. Specifically, this section details the following:

- participants in the study
- comparison of the baseline characteristics of the study participants between the three cohorts
- a detailed comparison of the health outcomes at 2 years between the three cohorts (specifically, disability, health related quality of life and core whiplash outcome)
- discussion.

Participants in the study

In the 1999 cohort of those who could be contacted, 397 refused consent, 50 could not speak English, leaving 165 available for participation in the study interview. Thus, in the 1999 cohort 36% (165/459) of contactable potentially eligible participants consented to participate in the study. The participation rate was similar for the 2001 and 2003 cohorts.

Comparison of baseline characteristics of study participants

With the exception of age there were no significant differences in baseline characteristics between cohorts (Table 9).

Table 9 Baseline characteristics of claimants with whiplash injuries, before (1999 cohort) and after (2001 and 2003 cohorts) legislative change

Characteristics	1999 (n=165)	2001 (n=147)	2003 (n=199)	Test of significance
Age (mean, years)	36.8	38.8	41.4	F=4.8, p=0.008
Female gender	71.5%	67.3%	74.2%	$\chi^2=2.0$, df=2, p=0.37
Employed	76.4%	64.1%	71.1%	$\chi^2=5.6$, df=2, p=0.06
Position in vehicle - Driver	80.0%	80.3%	81.9%	$\chi^2=0.3$, df=2, p=0.88
Prior claim	13.3%	5.4%	7.0%	$\chi^2=7.2$, df=2, p=0.03

Comparison of health outcomes at 2 years post injury between the three cohorts

Disability

The mean FRI at two years after injury was 38.0% (SE 1.9) for the 1999 cohort, 31.8% (SE 2.1) for the 2001 cohort and 30.1% (SE 1.8) for the 2003 cohort ($F=5.0$, $p=0.007$). This demonstrates that the 2001 and 2003 cohorts had significantly less disability than the 1999 cohort two years after injury. Defining a FRI of ≤ 25 as recovery, 37% (61/165) of the 1999 cohort had recovered at two years compared with 52% (76/147) of the 2001 cohort and 49% (98/199) of the 2003 cohort ($\chi^2=8.2$, $df=2$, $p=0.02$).

Using the pain intensity question of the FRI (a five item 0 to 4 scale), the mean (SE) pain intensity was 1.5 (0.1) for the 1999 cohort, 1.3 (0.1) for the 2001 cohort and 1.2 (0.1) for the 2003 cohort. The percentages of participants in each cohort reporting pain that was mild or less were 44.2%, 56.5% and 56.8% for 1999, 2001 and 2003 cohorts respectively ($\chi^2=6.8$, $df=2$, $p=0.03$).

Health related quality of life

After adjusting for age, the Physical Component Score of the SF36 for the 2001 and 2003 cohorts was significantly higher than the 1999 cohort (mean 43.4, SE 0.9 and 44.0, SE 0.8 vs mean 39.6, SE 0.9 respectively, $F=7.3$ $p = 0.001$), but there was no significant difference in the Mental Component Score of the SF 36 (mean (SE) for 1999, 2001 and 2003, 45.8 (0.8), 46.5 (0.9), 47.5 (0.8) respectively; $F=1.1$, $p = 0.34$).

The mean scores for the eight individual dimensions of the SF36 are shown in Figure 1. Significantly better health status was observed in the 2001 cohort in three out of eight dimensions, namely physical functioning (65.9 (2.1) vs 72.5 (2.2), $F = 4.5$, $p = 0.04$), role limited by physical problems (42.3 (3.4) vs 57.1 (3.6), $F = 9.0$, $p = 0.003$) and bodily pain (51.3 (2.1) vs 61.1 (2.2), $F = 10.5$, $p = 0.001$), after adjusting for age. The 2003 cohort also showed significant improvements, compared with the 1999 cohort, in these three dimensions and the additional dimension of mental health (67.4 (1.6) to 74.3 (1.6), $F = 4.2$, $p=0.01$). These values were calculated with Bonferroni correction.

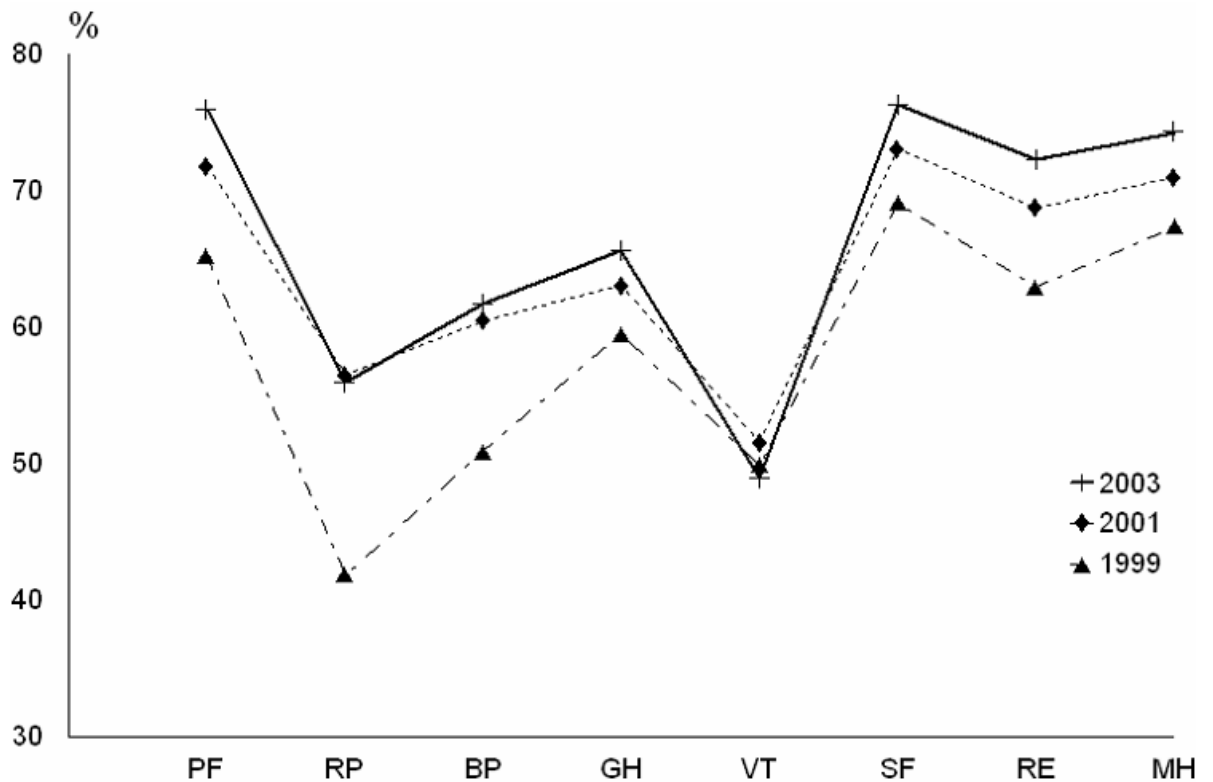


Figure 3 Comparison of each domain of the SF36 for the 1999, 2001 and 2003 cohorts after adjusting for age

pf – physical functioning, rp – role physical, bp – bodily pain, gh – general health, vt – vitality, re – role emotional, sf – social functioning, mh – mental health

Core whiplash outcome measure

Table 10 shows a comparison between the cohorts for the components of the Core Whiplash Outcome Measure (CWOM). The 2001 and 2003 cohorts have significantly more favourable outcomes in four of the five items of the CWOM. Bonferroni's multiple comparisons showed significant differences in CWOM summary score (the mean of the sum of the items of the CWOM) between 1999 vs 2001 ($p=0.04$) and 1999 vs 2003 ($p<0.001$). There was no significant difference between the scores in 2001 and 2003 ($p=0.79$).

Table 10 A comparison between the 1999, 2001 and 2003 cohorts, 2 years after whiplash injury, for individual components of the Core Whiplash Outcome Measure

Core whiplash outcome measure	1999 (n=165)	2001 (n=147)	2003 (n=199)	p-value
How bothersome (a)	2.7 (0.1)	2.4 (0.09)	2.2 (0.09)	0.001
Interference with normal work (b)	2.6 (0.1)	2.1 (0.09)	2.0 (0.09)	<0.001
Attitude if injury lasted for life (c)	2.2 (0.1)	2.5 (0.1)	2.7 (0.1)	0.004
Normal activities cut down (median days iqr) (d)	2 (0 to 7.5)	0 (0 to 4)	0 (0 to 4)	0.009
Work absense (median days iqr) (e)	0 (0 to 0)	0 (0 to 0)	0 (0 to 0)	0.21

Notes:

(a) 5 item scale, rated from 0 "not at all bothersome" to 4 "extremely bothersome"

(b) 5 item scale, rated from 0 "not at all" to 4 "extremely"

(c) 5 item scale, rated from 0 "very dissatisfied" to 4 "very satisfied"

(d) number of days in which regular activities were cut down in the last 4 weeks

(e) number of days in which work was cut down in the last 4 weeks

The CWOM item measuring global perceived change in whiplash symptoms is rated on a scale from -5 to +5, and a rating of 4 or greater is taken to indicate fully recovered. On this basis 21.8% of the 1999 cohort had recovered 2 years post injury compared to 30.6% of the 2001 cohort and 43.2% for the 2003 cohort ($\chi^2=19.2$, $df=2$, $p=0.001$).

Discussion

This study provides evidence that health outcomes for people with whiplash were substantially improved after legislative change that restricts access to compensation for non-economic loss, introduces clinical guidelines for the management of whiplash and provides earlier acceptance of compensation claims and greater provision of early treatment. These superior outcomes were sustained in a second cohort sustaining their injuries following the legislative change.

Improvement was demonstrated in both the degree of disability, physical functioning and pain, together with the percentage of people recovered. No difference was demonstrated in mental functioning as defined by the SF-36. With an additional 15% of people with whiplash injuries having a long term recovery in the post-legislative change cohort, the "number needed to treat" for this intervention (legislative change) was approximately seven. This compares very favourably with other health interventions^{xi}.

These findings provide evidence that the structure of the compensation scheme can positively influence health outcomes for injured people. Only people with whiplash were investigated because, prior to the change in legislation in 1999, whiplash was the most frequently recorded diagnosis in injured people claiming compensation^{xii} and some of the scheme changes were designed to reduce access to compensation for non-economic loss ('pain and suffering') for this cohort. Other legislative changes were made to encourage improved management of injuries. Since the legislative change compensation claims are being accepted and acted upon more quickly. However, the independent effects of the different components of the changed regulations cannot be determined.

Data from the government insurance regulator in NSW shows the total number of compulsory third party insurance claims has declined in the years after the legislative change in 1999^{xiii} and there has also been a reduction in the number of WAD claims being made. This reduction is unlikely to have reduced the number of claims for more 'severe' whiplash injuries. The expected effect of this may be to reduce the identified change in health using our method of sampling because the more 'severe' whiplash cases remained in the 2001 and 2003 cohorts.

It is not clear why physical functioning improved but mental functioning did not as shown between the two cohorts. The change in the scheme may have encouraged earlier physical activity but psychological stressors related to an injury where another party was judged to be at fault were still present and thus still influencing mental functioning. However, it is plausible that the SF36 may not have been sufficiently responsive to detect changes in psychological functioning.

A significant proportion of the people listed as having WAD from the insurance database did not participate in the study. For those people who could be contacted it was difficult to obtain informed consent. As the injuries were compensable there appeared to be concern on the part of some injured people, and their advisors, that participation in the study might influence their insurance claim although it was carefully explained that it would not. The participation rates obtained are acceptable given the setting of the study and a similar participation rate has been reported from Scandinavia^{xiv}.

The three cohorts that were studied had different exposures to telephone interviews. The 2001 and 2003 cohorts completed the questionnaires on three occasions (3 and 6 months, and 2 years after injury) while the 1999 cohort only had one exposure (2 years after injury). It is possible that the different interview schedules could have influenced the responses obtained but a major effect is unlikely due to the long period between the second and third interview for the 2001 and 2003 cohorts.

The major strengths of this study relate to a comprehensive set of health outcome measures recorded directly from people with whiplash. Standardised outcome measures were used as has been recommended^{xv} and the data were collected by interviewers who were unaware of the study hypotheses. A database was used in which all compensable whiplash injuries are recorded for a large population.

As outlined above, the weaknesses of the study include the use of the insurance database that may have limited the ability to gain cooperation of people with whiplash. In addition, whether compensation *per se* influences recovery from whiplash cannot be evaluated in this study because only people who are eligible for compensation have participated.

Overall this study has shown a significant improvement in health status, as assessed in relation to disability, pain and physical functioning, after legislative change that reduced compensation for disability for whiplash injury, and encouraged earlier acceptance of insurance claims, and early treatment. The improvement in health outcomes was maintained for more than four years after the legislative change. The magnitude of the improvement is such that an additional 15%, or one in seven, people with whiplash are recovered two years after their injury. This is likely to have substantial economic as well as health benefits. Design of compensation schemes should be undertaken with the understanding that the structure of the scheme may have substantial effects on the long term health of injured people.

Prospective health outcomes following WAD

This analysis aimed to define health outcomes of whiplash associated disorders (WAD) at three months, six months and two years and to examine predictors of these outcomes. Both the 2001 and 2003 cohort were analysed in this study as interviews for this cohort were conducted at 3 months, 6 months and 2 years post injury. The 2001 and 2003 cohorts were also compared to ascertain whether health outcomes gains were maintained, amplified or reduced several years after legislative change. Possible reasons for any differences in health outcomes between the 2001 and 2003 cohorts were also examined.

Whiplash claimants health outcomes and cost pre and post the 1999 NSW CTP legislative reforms

The health outcome measures analysed were:

- the FRI to measure disability and the proportion of participants recovered
- the CWOM to measure participation
- Short-Form 36 (SF-36) to measure health related quality of life.

In addition to measuring the health outcomes of the participants, independent predictors of recovery were determined using multiple linear regression.

The results of the health outcomes and linear regression are discussed in turn below followed by a discussion.

Health outcomes: disability and participation

The mean (SD) Functional Rating Index significantly improved over time for subjects in the 2003 cohort (Mean (SD) FRI at 3 months = 36.6 (2.2) and at 2 years = 27.4 (2.4), $p=0.001$, Table 11). However, although the mean (SD) disability at 2 years was lower in the 2003 cohort (27.2 (2.4)) compared with the 2001 cohort (32.1 (2.4)) this difference was not significant ($p=0.17$).

The mean (SD) Global Perceived effect significantly improved over time in the 2003 cohort (1.6 (0.2) at 3 months vs 2.5 (0.3) at 2 years; $p=.001$). This differed from the 2001 cohort, where the Global Perceived Effect did not improve over time ($p=0.53$). The mean (SD) Global Perceived Effect was significantly higher at 2 years in the 2003 cohort (2.5 (0.3) compared with the 2001 cohort (1.7 (0.3); $p=0.03$).

There were no significant differences in the number of days off work or activities between cohorts as measured by the CWOM at any time point (Table 12).

Table 11 Health outcome measures at baseline (3 months) and at follow up (6 months and 2 years) after sustaining whiplash injury: Cohort 1 (2001: pre-guideline) compared with Cohort 2 (2003:post guideline)

Variable	3 months	6 months	2 years	F-Statistic	p-value
FRI¹ score					
2001 cohort: Mean (SE) n=114	36.8 (2.09)	34.5 (2.28)	32.1 (2.40)	11.1	0.001
2003 cohort: Mean (SE) n=113	36.6 (2.20)	36.9 (2.20)	27.4 (2.40)	19	0.001
<i>Comparison between 2001 and 2003 cohorts (p-value)</i>	<i>0.95</i>	<i>0.45</i>	<i>0.17</i>		
% of claimants with FRI total index score of Recovered (0 <= FRI <= 25)					
2001 cohort	33.6% (n 84)	38.9% (n 77)	51.7% (n 76)	14.6	0.001
2003 cohort	35.5% (n 113)	37.6% (n 80)	49.2% (n 98)	9.3	0.009
<i>Comparison between 2001 and 2003 cohorts (p-value)</i>	<i>0.63</i>	<i>0.78</i>	<i>0.65</i>		
Global Perceived Effect (GPE)² Mean (SE)					
2001 cohort	1.5 (0.24)	1.5 (0.26)	1.7 (0.27)	0.4	0.53
2003 cohort	1.6 (0.24)	1.3 (0.27)	2.5 (0.25)	8.3	0.001
<i>Comparison between 2001 and 2003 cohorts (p-value)</i>	<i>0.77</i>	<i>0.59</i>	<i>0.03</i>		

¹Functional Rating Index (FRI), score range 0% to 100%

² Global Perceived Effect, scale -5 (vastly worse) to +5 (completely recovered).

Table 12 Core Whiplash Outcome Measure

Variable	3 months	6 months	2 years	F-Statistic	P value
CWOM Item 4¹ (Activity) - Median (25th – 75th Percentile)					
2001 cohort	1.5 (0.0-10.0)	1.0 (0.0-7.0)	0.0 (0.0-4.0)	13.2	0.001
2003 cohort	3.0 (0.0-12.0)	1.0 (0.0-11.0)	0.0 (0.0-4.0)	19.3	0.001
<i>Comparison between 2001 and 2003 cohorts (p-value)</i>	<i>0.001</i>	<i>1.00</i>	<i>1.00</i>		
CWOM Item 5² (Work) Median (25th – 75th Percentile)					
2001 cohort	0.0 (0.0-0.0)	0.0 (0.0-0.0)	0.0 (0.0-0.0)	0.001	0.98
2003 cohort	0.0 (0.0-1.0)	0.0 (0.0-0.0)	0.0 (0.0-0.0)	0.001	0.99
<i>Comparison between 2001 and 2003 cohorts (p-value)</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>		

¹ Number of days in past month you have cut down on the things you usually do for more than half the day because of whiplash symptoms

² Number of days in the past month your whiplash symptoms stopped you from going to work or school.

Health outcomes: Health related quality of life (SF 36)

The mean (SD) physical component score for the SF36 statistically improved over time for both the 2001 and 2003 cohorts (2001 cohort, $p = .002$; 2003 cohort, $p=0.006$; Table 13). However, the mean mental component score did not significantly change as time progressed for the 2001 cohort ($p=0.59$), but did change over time for the 2003 cohort ($p=.001$; Table 13).

Table 13 Health Related Quality of life (SF36, Mean Physical Component Score and Mental Component Score). Comparison of Cohort 1 with Cohort 2.

Sf-36 dimension	3 months	6 months	2 years	p-value
Physical Component score (2001)	40.6 (1.0)	42.6 (1.0)	43.7 (1.1)	0.002
Physical Component score (2003)	41.7 (1.0)	41.5 (1.0)	44.5 (1.1)	0.006
Mental Component score (2001)	43.5 (1.2)	44.0 (1.3)	44.7 (1.3)	0.590
Mental Component score (2003)	41.8 (1.3)	43.2 (1.2)	46.8 (1.2)	0.001

The profile of the 8 domains of the SF 36 at 2 years for each cohort has been described in the section on the long term health outcomes pre and post legislative change. The scores for each dimension are slightly higher for the 2003 cohort than the 2001 cohort, however the difference in these scores are not significant.

Figure 3 presents the change in SF36 scores between 3 months and 2 years for both the 2001 and 2003 cohorts. For the 2001 cohort, there was improvement over 7 of the 8 domains with 2 of the 8 domains showing statistically significant improvement, namely role physical and bodily pain. The 2003 cohort displayed improvement across all 8 domains and statistically significant improvement in 7 of the 8 domains (there wasn't a statically significant improvement in general health).

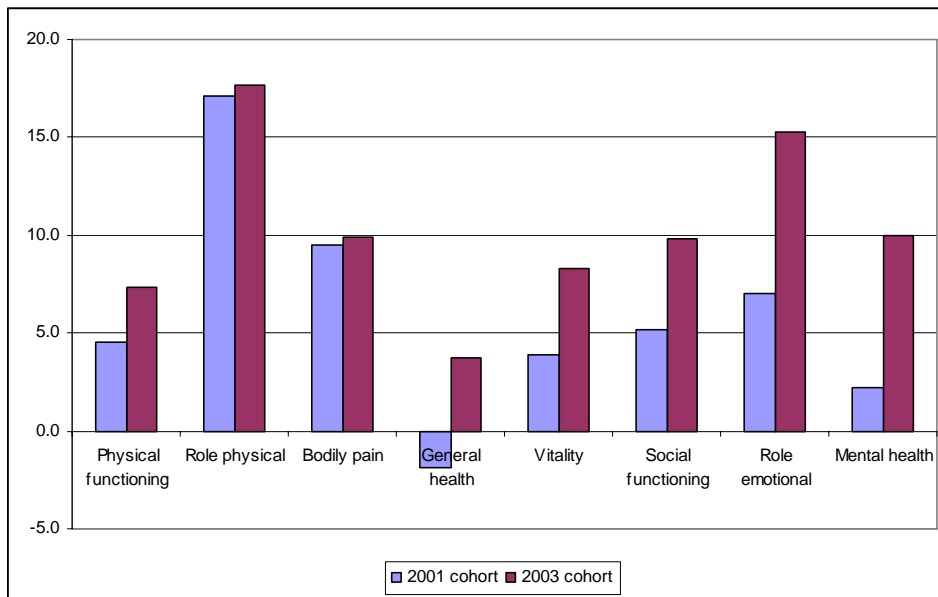


Figure 4 Change over time in SF36 domains – 2001 and 2003 cohorts

Independent predictors of recovery

The global perceived effect was the measure of recovery for these multiple linear regression analyses. The analyses were completed separately for each of the two cohorts. The predictors tested were:

- sociodemographic predictors (age, gender, education, IRSD).
- initial disability (FRI index at 3 months)
- psychological factors (SF-36 mental health component score at 3 months and the SF-36 mental health dimension)
- factors related to compensation (claim status, driver, time to admit liability (unit=100 days), economic loss claim and prior personal injury claim).

Factors that were associated with *poor outcome* in the 2001 cohort were higher initial disability and open claim status. (The R^2 adjusted for number of predictive factors was 0.20).

Factors that are associated with *recovery* in the 2003 Cohort were: lower initial disability (grouped in units of 10), younger age (10 year age bands) and a lower IRSD score. The R^2 adjusted for number of predictive factors was 0.34.

Discussion

The main finding of this analysis was that health outcomes improved over time for the 2001 cohort (immediately after legislative change) and this was maintained (and slightly improved) several years after legislative change (demonstrated by the 2003 cohort).

There were aspects of health that improved more significantly over time in the 2003 cohort compared to the 2001 cohort. These included greater global perceived effect, and better recovery in 5 more dimensions on the SF36 including general health, vitality, social functioning, role emotional and mental health. The greater improvement may have been due the implementation of clinical guidelines with insurers^{xvi} and treating health care practitioners^{xvii}, which resulted in improved claims and practitioner management of whiplash. In addition the wider influence of evidence based practice across musculoskeletal health care is known to contribute to improved health outcomes in general.

Clearly the combined results regarding recovery after whiplash from both cohorts, indicates that at least half of people with whiplash are not recovered at 2 years. This non-recovery of half the cohorts occurs even after legislation and implementation of clinical guidelines, factors both designed to improve health outcomes. These findings suggest that there are a cohort of people with WAD who do not recover and therefore may not respond to general interventions such as legislative change and release of clinical guidelines.

Identifying these non-recoverer's, and directing appropriate management to this cohort would therefore be the next step to improving health outcomes for people with whiplash. The combined results of both cohorts have identified that the major predictor of non-recovery after WAD is high initial disability. Several other sources of evidence have also concluded that high initial disability predicts non-recovery after WAD (e.g. ^{xviii}, ^{xix}). Furthermore, non-recovery was not associated with psychological factors or claim related factors in both cohorts. It is therefore suggested that greater emphasis should be placed on assessing disability soon after whiplash, and if high, directing resources to these patients. Less emphasis therefore, should be placed on the relevance of claim or psychosocial factors.

Cost outcome analysis

The results of the following analyses are presented in this section:

- examination of the finalisation patterns within each cohort
- analysis of the average claim size for whiplash claims by cohort (both the overall average claim size was considered and each head of damage – specifically medical, legal, economic loss, non-economic loss and other)
- analysis of the average claim size of whiplash claims by finalisation band and cohort
- analysis of the medical payment pattern since the time of accident for each head of damage.

ANF only claims were included in the analysis.

Finalisation rates

Table 14 presents the proportion of claims finalised at 30 June 2006.

Table 14 Proportion of finalised claims at 30 June 2006

Cohort	Proportion of claims finalised - including ANF only claims
1999	99.1%
2001	95.1%
2003	72.4%

Note: An allowance for incurred but not reported claims was made for the 2003 cohort

A high proportion of claims in the 1999 and 2001 cohorts were finalised at 30 June 2006. The proportion of finalised claims at points in time post injury was also analysed and this is presented in Table 15.

Table 15 Proportion of claims finalised at points in time

Cohort	Number of months since the accident													
	3 month	6 month	12 month	18 month	24 month	30 month	36 month	42 month	48 month	54 month	60 month	66 month	72 month	78 month
1999	0.44%	2.76%	17.44%	32.30%	50.00%	57.38%	68.86%	77.05%	85.85%	91.01%	94.66%	96.44%	97.51%	97.95%
2001	2.46%	14.27%	42.81%	57.43%	66.43%	71.58%	77.78%	82.11%	87.49%	92.28%				
2003	4.62%	17.80%	44.41%	54.88%	63.34%	70.23%								

Note: an allowance for incurred but not reported claims was made for the 2003 cohort

Table 15 indicates the following:

- a much higher proportion of claims were finalised in the first 12 months post injury for the 2001 and 2003 cohorts when compared to the 1999 cohort (approximately 43% compared with 17%)
- at 24 months post injury approximately 65% of claims are finalised in the 2001 and 2003 cohorts compared with 50% of the 1999 cohort claims.
- at 54 months (4 and a half years) post injury a similar proportion of claims were finalised in the 1999 and 2001 cohorts.

A desired outcome of the new legislation was earlier finalisation of small claims. This analysis demonstrates that this was achieved.

Average claims size analysis

This section analyses the average claim size of WAD claims for the 1999 and 2001 cohorts. The 2003 cohort was not analysed here due to a substantial proportion of claims not being finalised (as indicated in Table 14). The average claim size was analysed three different ways, these being:

- the average claim size for all finalised claims (as at 30 June 2006)
- the average claim size at the same stage of development (that is, the average claim size for the 1999 cohort was compared to the 2001 cohort at the 95% finalised mark)
- the average claim size on all claims (using case estimates to estimate the full cost of claims that are not yet finalised).

Whiplash claimants health outcomes and cost pre and post the 1999 NSW CTP legislative reforms

Table 16 compares the average claim size of WAD claims between the 1999 and 2001 cohort.

Table 16 Average claim size of WAD claims between the 1999 and 2001 cohort

Cohort	% finalised (excluding IBNR)	Average Claim Size on all finalised claims	Average claim size on the first 95% of claims	Estimated Average Claim Size on all claims (using case estimates)
1999	99.1%	\$46,590	\$43,083	\$47,768
2001	95.1%	\$21,347	\$21,347	\$28,824

Table 16 illustrates that the average claim size of WAD claims is estimated to be significantly lower for the 2001 cohort compared to the 1999 cohort - \$28,824 compared to \$47,768 or approximately \$19,000 per claim. This will result in significant savings to the scheme.

Table 17 breaks the average claim size down by head of damage. The results are presented two ways for the 1999 cohort – for all finalised claims and for the first 95% of finalised claims (the same stage of development as the 2001 cohort). The case estimates were not available by head of damage.

Table 17 Average claim size by head of damage – 1999 and 2001 cohorts

Cohort	Medical	Legal	Economic Loss	Non- economic loss	Other	Total
1999 (99% finalised)	\$6,411	\$11,763	\$12,154	\$13,912	\$2,349	\$46,590
1999 (95% finalised)	\$6,141	\$10,554	\$11,057	\$13,325	\$2,006	\$43,083
2001	\$4,816	\$3,471	\$8,685	\$2,469	\$1,906	\$21,347
1999 (99% finalised)	14%	25%	26%	30%	5%	100%
1999 (95% finalised)	14%	24%	26%	31%	5%	100%
2001	23%	16%	41%	12%	9%	100%

The 2001 cohort when compared to the 1999 cohort received a lower proportion of non-economic loss and legal payments but a higher proportion of medical, economic loss and other payments. The dollar amount difference between legal and non-economic loss payments between the 2001 and 1999 cohort is rather pronounced.

In summary, the average claim size is likely to be lower for the 2001 cohort compared to the 1999 cohort. This was driven mainly by lower legal and non-economic loss payments.

Average claim size by finalisation band

This section analyses average claim payments by finalisation band for each of the three cohorts. Claims were grouped depending on the time taken for them to finalise, for example, the first 10% of claims finalised were grouped together, then the next 10% of claims finalised were grouped together, etc.

Average claim payments are presented for all claims and exclusively for severity 1 claims. This analysis is also presented by head of damage. The numbers in italics in the following tables indicate that not all claims are finalised in the particular finalisation band.

Total payments per claim

Whiplash claimants health outcomes and cost pre and post the 1999 NSW CTP legislative reforms

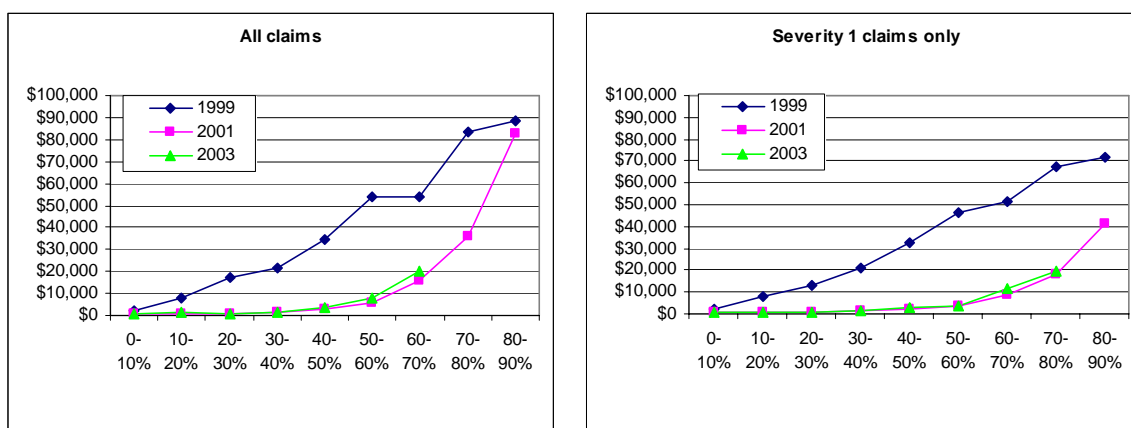


Figure 5 Total payments per claim by finalisation band and cohort

Table 18 Total payments per claim by finalisation band and cohort

<i>Total payments - all claims (including ANF only claims)</i>										
Cohort	0-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%
1999	2,247	8,177	17,405	21,661	34,560	54,216	53,715	83,371	88,783	107,276
2001	628	764	783	1,465	3,062	5,503	15,907	35,935	82,635	111,253
2003	508	1,430	847	1,287	3,587	8,168	20,150	32,352		
<i>Total payments - severity 1 claims only (including ANF only claims)</i>										
Cohort	0-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%
1999	2,209	7,784	13,353	21,179	32,373	46,707	51,706	67,057	71,913	87,812
2001	523	778	776	1,440	1,887	3,668	8,709	18,203	41,235	95,875
2003	528	1,034	998	1,100	2,891	3,981	11,568	19,759	8,532	

Figure 5 and Table 18 indicate the following:

- there was a substantial difference in average claim size for the first 70% of finalised claims between the 2001 and 2003 cohorts compared to the 1999 cohort
- the 2003 cohort is similar to the 2001 cohort, however, the average claim size for the 2003 cohort becomes higher than that of the 2001 cohort from the 50-60% band onwards
- for the 70-80% and 80-90% finalisation bands, however, the 2001 cohort average claim size is approaching the 1999 cohort average claim size
- whilst not all claims are finalised, the average claim size for the 2001 cohort in the 90-100% finalisation band is higher than for the 1999 cohort.

Figure 5 and Table 18 were reproduced including the case estimates on all claims that were not finalised at 30 June 2006. The case estimates for the 2001 cohort are likely to be more accurate than for the 2003 cohort due to being further developed.

Whiplash claimants health outcomes and cost pre and post the 1999 NSW CTP legislative reforms

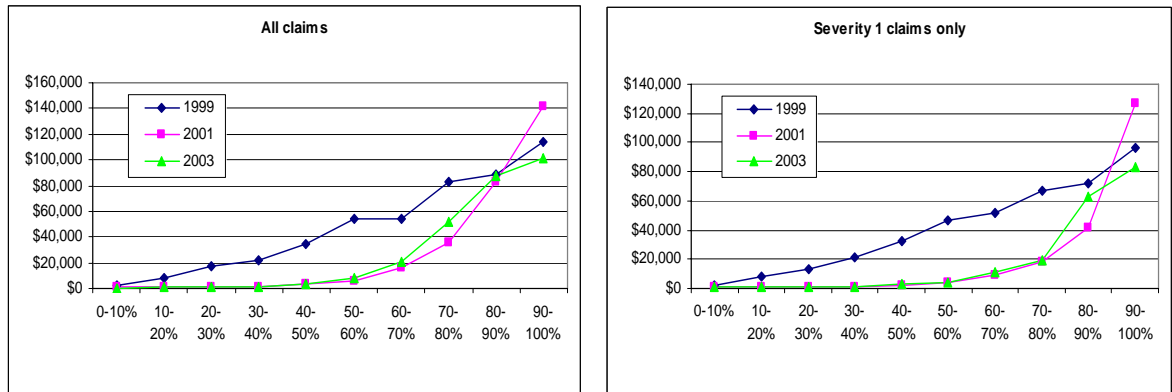


Figure 6 Reported incurred cost by finalisation band and cohort

Table 19 Reported incurred cost by finalisation band and cohort

<i>Total payments - all claims (including ANF only claims)</i>										
Cohort	0-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%
1999	2,247	8,177	17,405	21,661	34,560	54,216	53,715	83,371	88,783	113,678
2001	628	764	783	1,465	3,062	5,503	15,907	35,935	82,635	142,034
2003	508	1,430	847	1,287	3,587	8,168	20,150	51,786	87,022	101,429
<i>Total payments - severity 1 claims only (including ANF only claims)</i>										
Cohort	0-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%
1999	2,209	7,784	13,353	21,179	32,373	46,707	51,706	67,057	71,913	96,664
2001	523	778	776	1,440	1,887	3,668	8,709	18,203	41,235	126,458
2003	528	1,034	998	1,100	2,891	3,981	11,568	19,759	63,043	83,053

Including case estimates in the analysis, indicated that the average claim size within the 90-100% finalisation band was significantly higher (almost \$30,000 higher) for the 2001 cohort when compared to the 1999 cohort. This was true when looking at either all claims or severity 1 only claims.

It is recognised in this analysis, that the number of claims in each of the cohorts is not the same. There were more claims in each finalisation band for the 1999 cohort compared to the 2001 and 2003 cohorts. It can be assumed that the longer a claim takes to finalise the more severe it is likely to be and hence the more costly. This analysis could have been completed by comparing the number of claims in the 2001 cohort with the same number of claims in the 1999 cohort (by excluding the quickest to finalise claims from the 1999 cohort). This would most likely result in higher average claim sizes in each finalisation band for the 1999 cohort than is presented in this analysis and hence the results presented can be considered conservative.

Overall the average claim size significantly reduced post the legislative change for the small, quick to finalise claims. For the large, slow to finalise claims, the average claim size was higher post the legislative change. Thus, the reduction in overall average claim size was driven by the small claims.

Medical payments

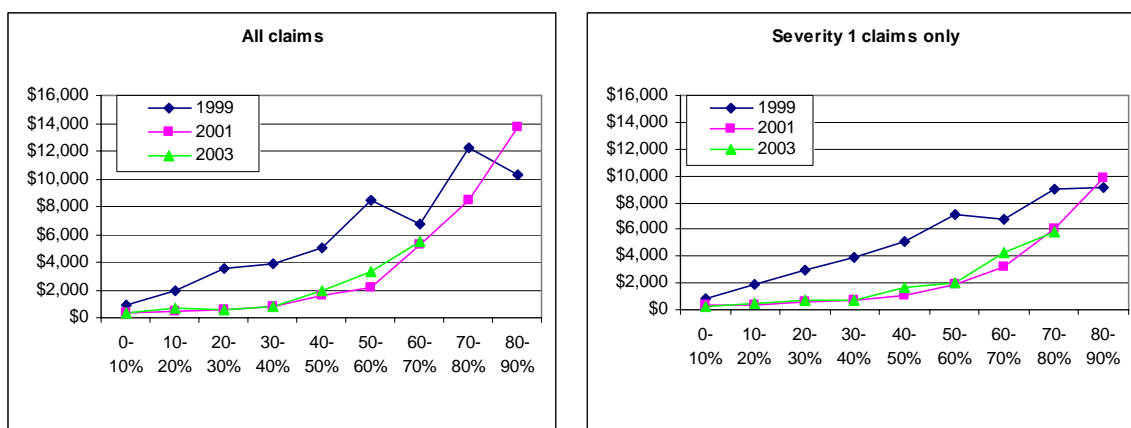


Figure 7 Medical payments by finalisation band and cohort

Table 20 Medical payments by finalisation band and cohort

<i>Medical payments - all claims (including ANF only claims)</i>										
Cohort	0-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%
1999	875	1,946	3,507	3,851	5,069	8,431	6,768	12,172	10,302	11,663
2001	354	406	546	802	1,572	2,175	5,248	8,448	13,688	24,859
2003	291	692	601	835	1,950	3,294	5,469	8,465		
<i>Medical payments - severity 1 claims only (including ANF only claims)</i>										
Cohort	0-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%
1999	822	1,884	2,914	3,874	5,146	7,098	6,807	9,043	9,181	9,735
2001	310	389	550	724	1,021	1,862	3,247	6,028	9,834	20,450
2003	294	525	722	749	1,714	2,072	4,230	5,814	1,442	

Figure 7 and Table 20 indicate the following:

- medical payments were lower for the first 80% of finalised claims for the 2001 and 2003 cohorts when compared to the 1999 cohort
- for claims in the 80-100% finalisation bands medical payments are higher for the 2001 and 2003 cohorts compared to the 1999 cohort.

Overall, average medical payments were lower post the legislative change for the small quick to finalise claims. It was thought that earlier access to treatment may result in higher medical payments; but this was not the case for these claims. It should be noted, however, that medical payments were higher in the short-term post the legislative change. This is discussed further in the analysis of payment pattern section.

Medical payments were higher for the large, slow to finalise claims post the legislative change.

Legal payments

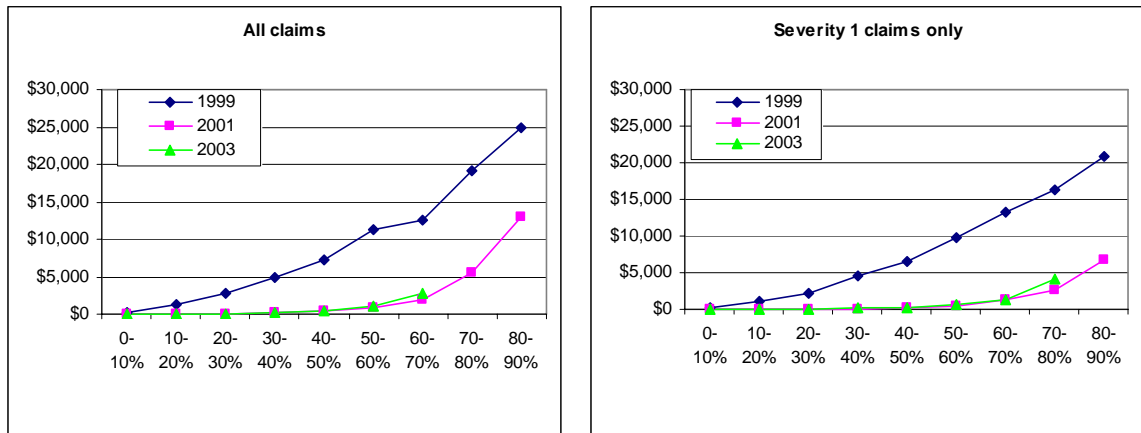


Figure 8 Legal payments by finalisation band and cohort

Table 21 Legal payments by finalisation band and cohort

<i>Legal payments - all claims (including ANF only claims)</i>										
Cohort	0-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%
1999	252	1,178	2,707	4,846	7,221	11,276	12,595	19,071	24,921	35,769
2001	22	67	52	158	487	888	1,826	5,438	12,995	21,921
2003	43	85	92	158	368	1,077	2,792	6,122		

<i>Legal payments - severity 1 claims only (including ANF only claims)</i>										
Cohort	0-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%
1999	256	1,089	2,158	4,591	6,574	9,832	13,160	16,365	20,921	32,184
2001	18	69	43	86	311	525	1,217	2,601	6,648	18,579
2003	43	63	103	152	297	583	1,384	4,225	3,572	

Figure 8 and Table 21 indicate that legal payments were lower for the 2001 and 2003 cohorts when compared to the 1999 cohort. This was a desired outcome of the new legislation.

Economic loss payments

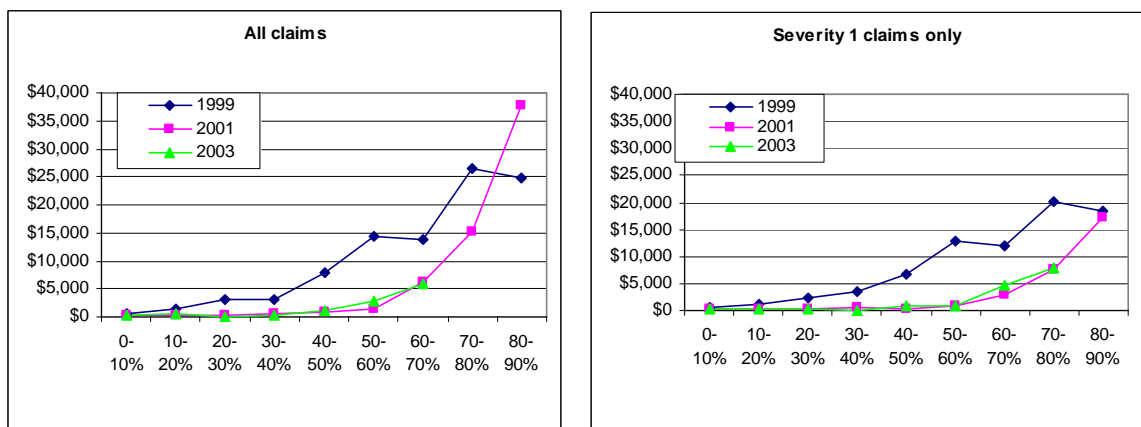


Figure 9 Economic loss payments by finalisation band and cohort

Table 22 Economic loss payments by finalisation band and cohort

<i>Economic loss payments - all claims (including ANF only claims)</i>										
Cohort	0-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%
1999	519	1,291	3,206	3,109	7,852	14,469	13,809	26,605	24,669	27,396
2001	245	255	186	469	753	1,496	6,210	15,078	37,748	39,716
2003	174	630	130	229	1,045	2,747	6,056	12,146		
<i>Economic loss payments - severity 1 claims only (including ANF only claims)</i>										
Cohort	0-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%
1999	552	1,288	2,192	3,410	6,746	12,864	11,939	20,266	18,333	19,112
2001	188	312	153	586	420	810	2,887	7,663	17,103	36,533
2003	190	428	147	124	852	948	4,569	7,768	3,517	

Figure 9 and Table 22 indicate the following:

- economic loss payments were lower for the first 80% of finalised claims for the 2001 and 2003 cohorts when compared to the 1999 cohort
- for all claims in the 80-100% finalisation bands economic loss payments were higher for the 2001 and 2003 cohorts compared to the 1999 cohort
- when only the severity 1 claims were included in the analysis it is not until the 90-100% finalisation band that the economic loss payments are higher for the 2001 cohort than the 1999 cohort.

Overall, economic loss payments reduced for the majority of claims post the legislative change. This was a desired outcome of the change in legislation.

Non-economic loss payments

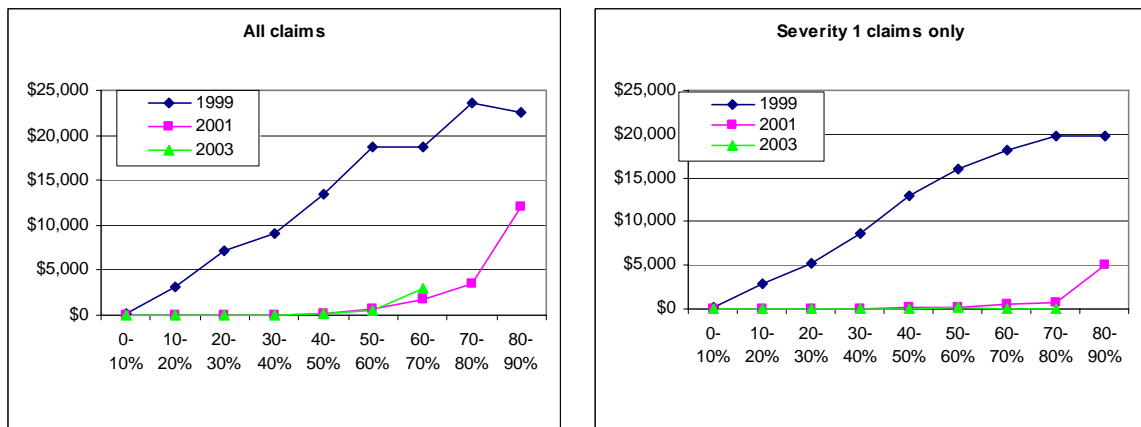


Figure 10 Non-economic loss payments by finalisation band and cohort

Whiplash claimants health outcomes and cost pre and post the 1999 NSW CTP legislative reforms

Table 23 Non-economic loss payments by finalisation band and cohort

<i>Non-economic loss payments - all claims (including ANF only claims)</i>										
Cohort	0-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%
1999	168	3,121	7,161	9,134	13,404	18,755	18,691	23,594	22,518	23,396
2001	0	0	0	0	111	686	1,679	3,423	12,083	10,812
2003	0	0	0	0	128	589	2,967	2,530		
<i>Non-economic loss payments - severity 1 claims only (including ANF only claims)</i>										
Cohort	0-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%
1999	134	2,911	5,299	8,557	12,937	15,998	18,115	19,765	19,698	18,142
2001	0	0	0	0	126	211	523	643	4,963	12,448
2003	0	0	0	0	0	140	33	53	0	

Figure 10 and Table 23 indicate that non-economic loss payments were substantially lower for the 2001 and 2003 cohorts when compared to the 1999 cohort. This was a desired outcome of the new legislation.

Other payments

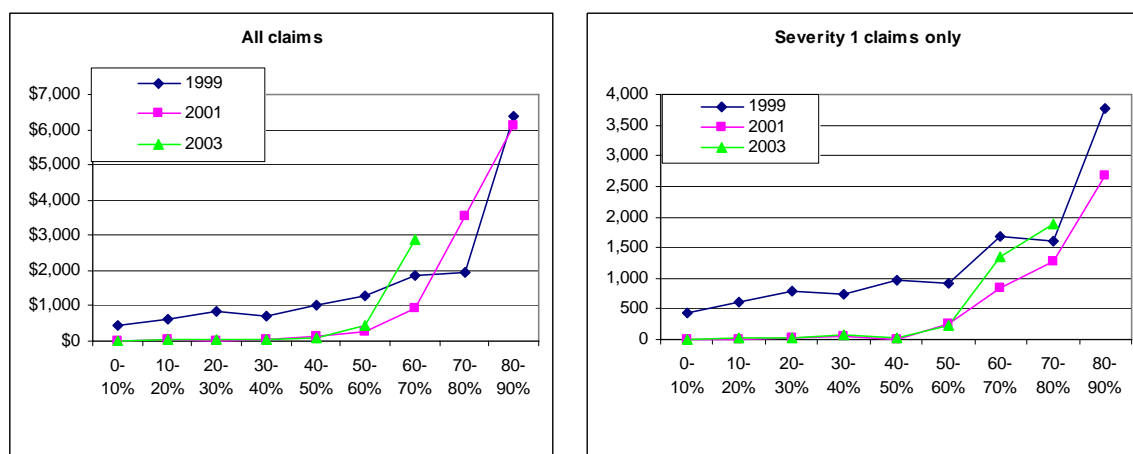


Figure 11 Other payments by finalisation band and cohort

Table 24 Other payments by finalisation band and cohort

<i>Other payments - all claims (including ANF only claims)</i>										
Cohort	0-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%
1999	432	641	824	721	1,013	1,285	1,852	1,929	6,373	9,052
2001	7	36	0	37	140	257	944	3,549	6,120	13,945
2003	1	23	24	65	97	462	2,866	3,089		
<i>Other payments - severity 1 claims only (including ANF only claims)</i>										
Cohort	0-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%
1999	445	612	791	747	971	915	1,685	1,618	3,780	8,640
2001	8	9	30	43	9	261	835	1,268	2,687	7,866
2003	1	19	26	74	28	237	1,353	1,898	0	

It should be noted that other payments are the smallest payment type contributing to the average claim size.

Figure 11 and Table 24 indicate the following:

- Other payments for the first 60% of finalised claims are lower for the 2001 and 2003 cohorts when compared to the 1999 cohorts.

Whiplash claimants health outcomes and cost pre and post the 1999 NSW CTP legislative reforms

- When only severity 1 claims are considered the 2001 cohort average claim size remains lower than the 1999 cohort average claim size. The 2003 cohort, however, has larger average payments than the 2001 cohort at almost all finalisation bands.
- When all claims are considered the average payment per claim for the 1999 and 2001 cohort was similar in the 70-100% finalisation bands.

Overall, other payments were lower for the small quick to finalise claims after the legislative reforms. Payments were similar post the reforms for claims that finalised relatively slower.

In summary, this analysis demonstrated that:

- The legislative changes were effective in reducing the average claim size of the smaller claims that finalise relatively quickly, yielding substantial savings to the scheme due to their high frequency.
- On the other hand, for large, slow to finalise claims there was evidence of higher payments after the legislative change where restrictions on payments did not exist. That is, for these larger claims, there were higher medical and economic loss payments after the legislative change.

Analysis of payment pattern

In addition to the analysis of the average claim size the medical payment pattern for each cohort was analysed in order to determine whether early access to treatment was obtained after the introduction of the Motor Vehicle Accident Compensation Act (1999).

As mentioned in the background section the data used in this analysis was at 30 June 2006. The development (which is the time elapsed between injury and 30 June 2006) for each cohort was:

- 78 months for the 1999 cohort
- 54 months for the 2001 cohort
- 24 months for the 2003 cohort

Table 25 illustrates the points in time when the cohorts were analysed.

Table 25 Development of claims post injury at 30 June 2006

Cohort	3 months	6 months	12 months	18 months	24 months	30 months	36 months	42 months	48 months	54 months	60 months	66 months	72 months	78 months
1999	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2001 Wave 1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2001 Wave 2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2003 Wave 1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2003 Wave 2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2003 Wave 3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

The results of this analysis are only presented including the ANF only claims. There are limitations to this analysis as the finalisation rates are different between the three cohorts. This distorts the comparison that is able to be made between the cohorts. Nonetheless, Table 26 illustrates that medical payments on a per claim basis were substantially higher for the 2001 and 2003 cohorts

compared to the 1999 cohort in the first 6 months post injury. This indicates that the early access to treatment was achieved after the introduction of the new legislation.

Table 26 Comparison of medical payment pattern between the three cohorts

Medical	3 months	6 months	12 months	18 months	24 months	30 months	36 months	42 months	48 months	54 months
1999	20	234	937	870	803	646	629	775	823	342
2001	115	424	710	423	402	322	464	424	717	465
2003	152	520	703	561	543					
2001 Cohort as a % of the 1999 Cohort	563.4%	181.7%	75.8%	48.6%	50.0%	49.9%	73.8%	54.8%	87.2%	135.9%
2003 Cohort as a % of the 1999 Cohort	746.3%	222.6%	75.1%	64.5%	67.7%					

Table 26 also illustrates that the large claims that finalised relatively later in the 2001 cohort drove the higher payments at 54 months post injury.

Summary of findings

Finalisation rates

Small claims finalised faster after the legislative changes compared to before the legislative changes. The analysis demonstrated that at 12 months post injury, approximately 43% of claims had finalised in the 2001 and 2003 cohorts compared to 17% of claims in the 1999 cohort.

Average claim size and savings to the scheme

The average claim size is likely to be lower for the 2001 cohort compared to the 1999 cohort (\$28,824 compared to \$47,768 or approximately \$19,000 lower per claim). This was driven mainly by lower legal and non-economic loss payments.

The decrease in average claim size was driven by a reduction in the average claim size of the smaller claims that finalise relatively quickly. This yielded substantial savings to the scheme due to their high frequency.

On the other hand, for large, slow to finalise claims there was evidence of higher payments after the legislative change where restrictions on payments did not exist. That is, for these larger claims, there were higher medical and economic loss payments after the legislative change.

Earlier access to treatment

Medical payments on a per claim basis were substantially higher for the 2001 and 2003 cohorts compared to the 1999 cohort in the first 6 months post injury. This indicates that the early access to treatment was achieved after the introduction of the new legislation.

5 Acknowledgements

The work presented in this paper was funded by the NSW Motor Accidents Association.

The authors would like to acknowledge the contribution of the following people from the School of Public Health, University of Sydney.

Doungkanol Sindhusake

George Rubin

William Schofield (deceased)

ⁱ Motor Accidents Authority of NSW. Whiplash and the New South Wales Accident Scheme Statistical Information Paper number 7, 1999.

ⁱⁱ Motor Accidents Authority of NSW. Whiplash and the New South Wales Accident Scheme Statistical Information Paper number 7, 1999.

ⁱⁱⁱ Motor Accidents Authority of NSW, Request for proposal – Health outcomes of claimants with whiplash-associated disorders.

^{iv} In order to provide a sufficiently large sample pool for the 2003 cohort, three ‘waves’ of claimants were created. The first wave contained respondents who had submitted a claim between July and September 2003, the second wave contained respondents who submitted a claim between October and December 2003 and the third wave had submitted claims between January and March 2004.

^v Australian Bureau of Statistics. National Health Survey. SF-36 Population Norms. Australia. (4399.0). Canberra. Australian Bureau of Statistics, 1997.

^{vi} <http://www.swin.edu.au/victims/resources/assessment/health/sf36.html>

^{vii} Feise, J. And M. Menke, Functional Rating Index. A new valid and reliable instrument to measure the magnitude of clinical change in spinal conditions. *Spine*, 2001. 26(1): p.78-87.

^{viii} Deyo RA, Battoe M, Beurskens AJ, et al. Outcome measure for low back pain research. A proposal for standardized use. *Spine*. 1998; 23; 2003-13.

^{ix} Rebbeck T, Refshauge K, Maher C, Stewart M. Evaluation of the Core Outcome Measure in Whiplash. *Spine* 2007; 32 (6).

^x Index of Relative Socioeconomic Disadvantage (IRSD) is one index of the Socio-Economic Indexes for Areas (SEIFA). Scores on the IRSD range from 917 to 1152 where a lower score indicates greater disadvantage. Socioeconomic disadvantage is associated with a higher prevalence of health risk factors and higher rates of hospitalisations, deaths and other adverse health outcomes.

^{xi} Anon. Table of NNTs. Bandolier <http://www.jr2.ox.ac.uk/bandolier/band50/b50-8.html> (Accessed 15 September 2006).

^{xii} Motor Accidents Authority of NSW. Whiplash and the New South Wales Accident Scheme Statistical Information Paper number 7, 1999.

^{xiii} Motor Accidents Authority of NSW. Annual Report 2004-2005. Available from <http://www.maa.nsw.gov.au> (Accessed 17 September 2006).

- ^{xiv} Miettinen T, Leino E, Airaksinen O and Lindgren KA. The possibility to use simple validated questionnaires to predict long-term health problems after whiplash injury. *Spine* 2004; 29(3):E47-E51
- ^{xv} Scholten-Peeters GGM, Verhagen AP, Bekkering GE, van der Windt DAWM, Barnsley L, Oostendorp RAB, Hendriks EJM. Prognostic factors of whiplash-associated disorders: a systematic review of prospective cohort studies. *Pain* 2003;104:303–322
- ^{xvi} Rebbeck T, Refshauge K, Maher C. Use of clinical guidelines for whiplash by insurers. *Aust Health Rev* 2006;30:442-9.
- ^{xvii} Rebbeck T, Maher C, Refshauge K. A cluster randomised trial of two implementation strategies for whiplash guide liens in physiotherapy. *Australian Journal of Physiotherapy*. 2006;in press.
- ^{xviii} Miettinen T, Leino E, Airaksinen O, et al. The possibility to use simple validated questionnaires to predict long term health problems after whiplash injury. *Spine* 2004b;29:E47-E51.
- ^{xix} Scholten-Peeters GGM, Verhagen AP, Bekkering GE, et al. Prognostic factors of whiplash-associated disorders: A systematic review of prospective cohort studies. *Pain* 2003;104:303-22.