THE ASSOCIATION BETWEEN COMPENSATION AND OUTCOME AFTER INJURY.

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A thesis submitted for the degree of Doctor of Philosophy in the Faculty of Medicine, University of Sydney.

July 2006
DECLARATION

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma of the university or other institute of higher learning.

This research was developed by the author, with guidance from the two supervisors. Assistance with data collection and statistical analysis, and specific advice, where provided, is outlined in the acknowledgements. All other work, including all writing, was performed by the author alone.
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ABSTRACT

Work-related injuries and road traffic injuries are common causes of morbidity and are major contributors to the burden of disease worldwide. In developed countries, these injuries are often covered under compensation schemes, and the costs of administering these schemes is high. The compensation systems have been put in place to improve the health outcomes, both physical and mental, of those injured under such systems; yet there is a widespread belief, and some evidence, that patients treated under these schemes may have worse outcomes than if they were treated outside the compensation system.

Chapter One of this thesis explores the literature pertaining to any effect that compensation may have on patient outcomes. It is noted that the concept of “compensation neurosis” dates from the nineteenth century, with such injuries as “railway spine”, in which passengers involved in even minor train accidents at the time, would often have chronic and widespread symptoms, usually with little physical pathology. Other illnesses have been similarly labelled over time, and similarities are also seen in currently diagnosed conditions such as repetition strain injury, back pain and whiplash. There are also similarities in a condition that has been labelled “shell shock”, “battle fatigue”, and “post-traumatic stress disorder”; the latter diagnosis originating in veterans of the Vietnam War.

While there is evidence of compensation status contributing to the diagnosis of some of these conditions, and to poor outcomes in patients diagnosed with
these conditions, there is little understanding of the mechanism of this association. In contrast to popular stereotypes, the literature review shows that malingering does not contribute significantly to the effect of compensation on health outcomes. Secondary gain is likely to play an important role, but secondary gain is not simply confined to financial gain, it also includes gains made from avoidance of workplace stress and home and family duties.

Other psychosocial factors, such as who is blamed for an injury (which may lead to retribution as a secondary gain) or the injured person’s educational and occupational status, may also influence this compensation effect.

The literature review concludes that while the association between compensation and health after injury has been widely reported, the effect is inconsistent. These inconsistencies are due, at least in part, to differences in definitions of compensation (for example, claiming compensation versus using a lawyer), the use of different and poorly defined diagnoses (for example, back pain), a lack of control groups (many studies did not include uncompensated patients), and the lack of accounting for the many possible confounding factors (such as measures of injury severity or disease severity, and socio-economic and psychological factors). The literature review also highlighted the variety of different outcomes that had been used in previous studies, and the paucity of literature regarding the effect of compensation on general health outcomes.
This thesis aims to explore the association between compensation status and health outcome after injury. It addresses many of the methodological issues of the previously published literature by,

i selecting study populations of patients with measurable injuries,
ii clearly defining and separating aspects of compensation status,
iii including control groups of non-compensated patients with similar injuries
iv allowing for a wide variety of possible confounders, and
v using clearly defined outcome measures, concentrating on general health outcomes.

Before commencing the clinical studies reported in Chapters Three and Four, a systematic review and meta-analysis was performed to quantify and analyse the effect of compensation on outcome after surgery. This allowed a clearly defined population of studies to be included, and was relevant to the thesis as the surgeries were performed as treatment of patients who had sustained injuries. The study, which is reported in Chapter Two, hypothesised that outcomes after surgery would be significantly worse for patients treated under compensation schemes.

The study used the following data sources: Medline (1966 to 2003), Embase (1980 to 2003), CINAHL, Cochrane Controlled Trials Register, reference lists of retrieved articles and textbooks, and contact with experts in the field. The review included any trial of surgical intervention where compensation status was reported and results were compared according to that status, and no
restrictions were placed on study design, language or publication date. Data extracted were study type, study quality, surgical procedure, outcome, country of origin, length and completeness of follow-up, and compensation type. Studies were selected by two unblinded independent reviewers, and data were extracted by two reviewers independently.

Data were analysed using Cochrane Review Manager (version 4.2). Two hundred and eleven papers satisfied the inclusion criteria. Of these, 175 stated that the presence of compensation (worker’s compensation with or without litigation) was associated with a worse outcome, 35 found no difference or did not describe a difference, and one paper described a benefit associated with compensation.

A meta-analysis of 129 papers with available data (20,498 patients) revealed the summary odds ratio for an unsatisfactory outcome in compensated patients to be 3.79 (95% confidence interval 3.28 to 4.37, random effects model). Grouping studies by country, procedure, length of follow-up, completeness of follow-up, study type, and type of compensation showed the association to be consistent for all sub-groups.

This study concludes that compensation status is associated with poor outcome after surgery, and that this effect is significant, clinically important and consistent. Therefore, the study hypothesis is accepted. However, as data were obtained from observational studies and were not homogeneous, the summary effect should be interpreted with caution.
Determination of the mechanism for the association between compensation status and poor outcome, shown in the literature review (Chapter One) and the systematic review (Chapter Two) required further study. Two studies were designed to further explore this association and these are reported in Chapters Three and Four.

The retrospective study reported in Chapter Three, the Major Trauma Outcome Study (MTOS), aimed to explore the association between physical, psychosocial, and compensation-related factors and general health after major physical trauma. The primary hypothesis predicted significantly poorer health outcomes in patients involved in pursuing compensation, allowing for possible confounders and interactions. The study also examined other health outcomes that are commonly associated with compensation, and examined patient satisfaction.

Consecutive patients presenting to a regional trauma centre with major trauma (defined as an Injury Severity Score greater than 15) were surveyed between one and six years after their injury. The possible predictive factors measured were: general patient factors (age, gender, the presence of chronic illnesses, and the time since the injury), injury severity factors (injury severity score, admission to intensive care, and presence of a significant head injury), socio-economic factors (education level, household income, and employment status at the time of injury and at follow-up), and claim-related factors (whether a claim was pursued, the type of claim, whether the claim had settled, the time to settlement, the time since settlement, whether a lawyer
was used, and who the patient blamed for the injury). Multiple linear regression was used to develop a model with general health (as measured by the physical and mental component summaries of the SF-36 General Health Survey) as the primary outcome. The secondary outcomes analysed were: neck pain, back pain, post-traumatic stress disorder, and patient satisfaction.

On multivariate analysis, better physical health was significantly associated with increasing time since the injury, and with lower Injury Severity Scores. Regarding psychosocial factors, the education level and household income at the time of injury were not significantly associated with physical health, but pursuit of compensation, having an unsettled claim, and the use of a lawyer were strongly associated with poor physical health.

Measures of injury severity or socio-economic status were not associated with mental health. However, the presence of chronic illnesses and having an unsettled compensation claim were strongly associated with poor mental health.

Regarding the secondary outcomes, increasing neck pain and back pain were both significantly associated with lower education levels and the use of a lawyer, but not significantly associated with claiming compensation. The severity of symptoms related to post-traumatic stress disorder was not associated with measures of injury severity, but was significantly and independently associated with the use of a lawyer, having an unsettled compensation claim, and blaming others (not themselves) for the injury. The
strongest predictor of patients’ dissatisfaction with their progress since the injury was having an unsettled compensation claim, and as with the other secondary outcomes, patient satisfaction was not significantly associated with injury severity factors.

Factors relating to the compensation process were among the strongest predictors of poor health after major trauma, and were stronger predictors than measures of injury severity. The hypothesis that general physical and mental health would be poorer in patients involved in seeking compensation for their injury was accepted. This study concludes that the processes involved with claiming compensation after major trauma may contribute to poor health outcomes.

The prospective study reported in Chapter Four, the Motor Vehicle Accident Outcome Study (MVAOS), aimed to explore the effect of compensation related factors on general health in patients suffering major fractures after motor vehicle accidents (MVAs). The study hypothesized that general health would be poorer in patients claiming compensation for their injuries.

Patients presenting to 15 hospitals with one or more major fractures (any long bone fracture, or fracture of the pelvis, patella, calcaneus or talus) after a motor vehicle accident were invited to participate in this prospective study. Initial data was obtained from the patient and the treating doctors. Both the patients and treating surgeons were followed up with a final questionnaire at six months post injury. General factors (age, gender, treating hospital, country
of birth, presence of chronic illnesses and job satisfaction), injury factors (mechanism of injury, number of fractures, and the presence of any non-orthopaedic injuries), socioeconomic factors (education level, income, and employment status), and compensation-related factors (whether a claim was made, the type of claim, whether a lawyer was used, and who was blamed for the injury) were used as explanatory variables. The primary outcome was general health as measured by the physical and mental component summaries of the SF-36 General Health Survey. The secondary outcomes were neck pain, back pain, and patients’ ratings of satisfaction with progress and of recovery. Multiple linear regression was used to develop predictive models for each outcome.

Completed questionnaires were received from 232 (77.1%) of the 301 patients included in the study. Poor physical health at six months was strongly associated with increasing age, having more than one fracture, and using a lawyer, but not with pursuit of a compensation claim. Poor mental health was associated with using a lawyer and decreasing household income.

Increasing neck pain and back pain were both associated with the use of a lawyer and with lower education levels. Higher patient satisfaction and patient-rated recovery were both strongly associated with blaming oneself for the injury, and neither were associated with pursuit of compensation.
Although the use of a lawyer was a strong predictor of the primary outcomes, the pursuit of a compensation claim was not remotely associated with these outcomes, and therefore the study hypothesis was rejected.

The studies reported in this thesis are compared in the final chapter, which concludes that poor health outcomes after injury are consistently and strongly associated with aspects of the compensation process, particularly the pursuit of a compensation claim, involvement of a lawyer, and having an unsettled claim. Compensation systems may be harmful to the patients that these systems were designed to benefit. Identification of the harmful features present in compensation systems may allow modification of these systems to improve patient outcomes.
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<td>AIS</td>
<td>Abbreviated Injury Scale</td>
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<td>ABS</td>
<td>Australian Bureau of Statistics</td>
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<td>ANOVA</td>
<td>Analysis of variance</td>
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<tr>
<td>CI</td>
<td>Confidence interval</td>
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<td>CTP</td>
<td>Compulsory Third Party insurance</td>
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<td>DF</td>
<td>Degrees of freedom</td>
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<tr>
<td>DSM</td>
<td>Diagnostic and Statistical Manual of Mental Disorders</td>
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<tr>
<td>HAVS</td>
<td>Hand Arm Vibration Syndrome</td>
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<tr>
<td>ISS</td>
<td>Injury Severity Score</td>
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<td>LEAP</td>
<td>Lower Extremity Assessment Project</td>
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<tr>
<td>MMPI</td>
<td>Minnesota Multiphasic Personality Inventory</td>
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<td>MRI</td>
<td>Magnetic resonance imaging</td>
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<td>MBA</td>
<td>Motor bike accident</td>
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<td>MBC</td>
<td>Motor bike crash</td>
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<td>MCS</td>
<td>Mental component summary (of the SF-36)</td>
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<td>M-H</td>
<td>Mantel-Haenszel</td>
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<td>MTOS</td>
<td>Major Trauma Outcome Study</td>
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<td>MVA</td>
<td>Motor vehicle accident</td>
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<tr>
<td>MVC</td>
<td>Motor vehicle crash</td>
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<td>PTSD</td>
<td>Post-traumatic stress disorder</td>
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<td>RSI</td>
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<td>SD</td>
<td>Standard deviation</td>
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<td>SF-36</td>
<td>Short-Form 36 General Health Survey</td>
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<td>TOS</td>
<td>Thoracic outlet syndrome</td>
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