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Clinical Outcome Review: A Retrospective Assessment of 171 Patients Referred for Physiotherapy Treatment after Whiplash Injury by Medical Insurance Intermediaries

Gunnel Berry

ABSTRACT

The purpose of this review is to share outcomes from 171 patients of acute and chronic grade 0-2 whiplash injury referred for physiotherapy treatment by nine insurance intermediaries after a road traffic accident. An unorthodox method of treatment and assessment was used and the review is retrospective. After assessment, a prediction of outcome including proposed method, number of treatments and improvement measured in percentages was delivered to the insurance intermediaries for approval prior to commencing treatment. In effect, the insurance intermediaries became external assessors in all cases with the author acting as the sole physiotherapist carrying out the assessment and treatment. Adapted Reflextherapy was used as the method to assess and treat all patients. Nine patients did not start or complete the treatment leaving 162 patients included in the review. The mean number of treatments per patient was 5.02. Pain levels varied between 0 and 10 on the VAS scale with 65% (106) of patients reporting pain levels between 5 and 10 before treatment, dropping to below 2 after treatment. In 41% (66), fewer treatments were required to achieve the expected outcome. In 30% of patients (48), the prediction of outcome was completely correct. 30% (52) of patients required a few more treatments than predicted requiring approval from the insurance companies.

Keywords: Clinical Outcome Review, Whiplash Injury, Prediction of treatment, Outcomes, Adapted Reflextherapy.

INTRODUCTION

This service evaluation reviews 171 patients referred for assessment and treatment after a whiplash injury incurred during travel in a vehicle as a driver (n=166) or passenger (n=3), or on a motorbike (n=2). All patients were referred by 9 different private insurance intermediaries to a private physiotherapy clinic. The majority of vehicles were hit from behind but some were 'head-on' (5), 'double' or 'sideways' blows all resulting in a grade 0–2 whiplash injury, with some of them advancing to a chronic condition, Whiplash Associated Disorder (WAD).[1] The therapist who carried out the assessment and treatment of all patients had 40+ years of experience in treating cohorts of musculo-skeletal patients as a Clinical Specialist in Pain and Extended Scope Practitioner in the National Health Service and in own private practice.

Adapted Reflextherapy, AdRx, [2,3,4] was developed by the therapist 25 years ago in response to an excessive demand of whiplash-injured patients from RTAs and a train crash affecting passengers in 1999. On the strength of good outcomes, AdRx was selected as method of choice to assess and treat all cases. A prediction of outcome and treatment method was required for

approval by the insurance intermediaries. 72% of all patients achieved the predicted outcome irrespective of chronicity.

The main interest of this review is to compare acute and chronic WAD patients with regards to gender, type of occupation, number of treatments and predicted percentage (%) of improvement using Adapted Reflextherapy, AdRx, as method of treatment. No correlation was found between number of weeks since time of accident and percentage of improvement achieved, i.e. the time between the injury and receiving treatment was insignificant in the outcomes. Few patients were attributed to have a biopsychosocial origin of symptoms in contrast with common observations where whiplash injuries, historically, enduring >3 months have biopsychosocial symptoms [5,6]. There was no co-ordination between persons who had had multiple whiplash injuries (maximum 4) compared with those who had had only one accident in their lifetime.

REFERRAL PROCEDURE

Patients were referred for physiotherapy assessment and treatment by 9 insurance intermediaries over a period of 11 years. Each patient was contacted within 48 hours and seen within one week by the physiotherapist. Each insurance company had their own assessment and treatment criteria but all requested a summary to contain details of presenting pain, prediction of number of treatments, expected level of improvement and a treatment plan before treatment could commence. The first assessment was included in the total number of treatments carried out. No proposal by the physiotherapist was rejected. Once approval was granted by the insurance company, the patient was contacted to continue treatment until an appropriate discharge date. A discharge letter was returned to the intermediary with details of outcomes.

Demographics

Of 171 patients referred for physiotherapy treatment after a whiplash injury, 162 patients were finally included in the review to assess predicted and actual outcomes after treatment. Nine patients were excluded from the final Clinical Outcome Review as they did not start or complete the treatment for various reasons. The final number of patients totals 162 patients (n=162) starting and completing a course of physiotherapy treatment: female 103 (64%); male 59 (36%).

Table 1: Ages 18 – 89 years old (n=162)

0 – 19	6 (4%)
20 – 29	39 (24%)
30 – 39	**46 (28%)**
40 – 49	35 (22%)
50 – 59	19 (12%)
60 – 69	13 (7%)
70 – 79	2 (1%)
80 – 89	2 (1%)

Occupation

Occupations are divided into categories relating to ‘physical demands’ and occupational activity.

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Table 2: Category of occupation

Sedentary	***74**
Physical	34
Management	13
Prolonged standing	11
Housewife	10
Semi-physical	9
Unknown	6
Other	5
Total	**162**

Table 3: Age distribution of those with sedentary occupation (n=74)

0 – 19	4
20 – 29	16 (21%)
30 – 39	***25 (34%)**
40 – 49	12
50 – 59	8
60 – 69	4
70 – 79	4
80 – 89	1

Duration of Symptoms

Table 4: Time elapsed since injury. (A)=acute; (C)=chronic

Time elapsed since injury		
1 – 12 weeks	67	(A)
13 – 24 weeks	41	(C)
25 weeks – 1 year	26	(C)
1 – 2 years	11	(C)
2+ years+	11	(C)
Unidentified	6	

Total number of: Acute (A) 67 (41%), Chronic (C) *89 (55%), Unidentified 6 (4%)

First point of contact after RTA

Relevance: What advice and/or help was offered at the various institutions to avoid chronicity? Who did the patient turn to in the first instance after the injury? 68 patients contacted their GP as the first point of contact. 26 patients went to A&E to seek help. Only 2 patients sought help from a physiotherapist as first point of contact. 21 cases were unidentified.

Table 5: First point of contact after RTA

Doctor (GP)	***68**	Doctor/Paramedic	7
A&E	***26**	Doctor/Police	3
Consultant	1	Doctor & Physio	1
A&E/Doctor	7	A&E/Paramedic	2
A&E/Police	2	Paramedic	9
Paramedic/Police	8	Physio	2
Hospital	2	Home	1
Unknown	21	Police	1

		No one	1
		Total	162

Travel Distance to Clinic

105 patients travelled 8 miles to the clinic for assessment and treatment. 8 patients travelled 30 or more miles for treatment. The question was whether an unorthodox treatment would put patients off. This review supports the patients' compliance with treatment.

Table 6: Travel distance to clinic

Number of patients (n=162)	Distance to Clinic (miles)
7	6
*105	*8
25	10
11	12
6	21
3	30
5	> 30 miles

Presenting Symptoms

The Visual Analogue Scale (VAS) 0–10 is used throughout to measure symptoms:

Symptoms:

a. Pain
b. Irritability
c. Numbness
d. Dysfunction

Pain

Pain varied between 0 and 10 with the majority reporting levels between 4 and 8 on the VAS scale. Almost a quarter (23%) of patients scored their pain at 5 and 9 patients reported no pain.

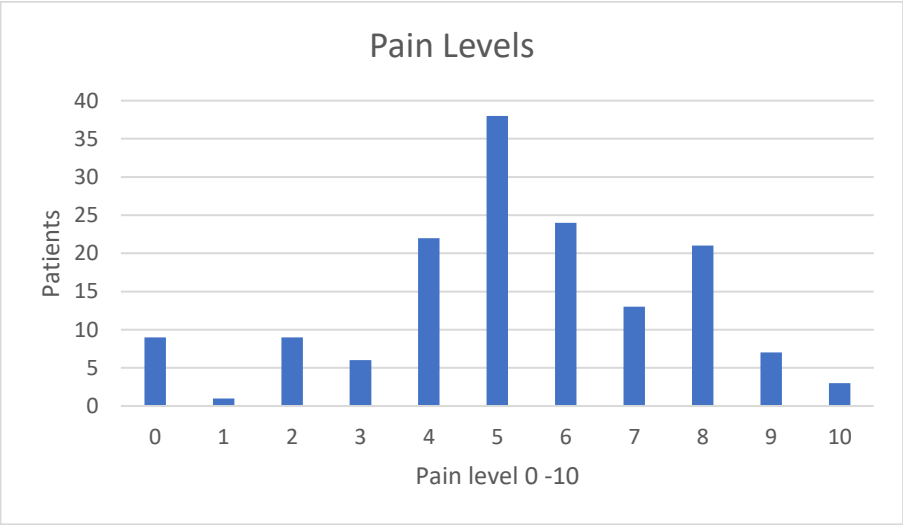

Figure 1: Pain reported by patients

X-axis: 0–10 (VAS Scale), Y-axis: 0–40 patients

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Irritability:
'Irritability' measures how easy it is to reproduce pain, rather than experiencing plain 'pain'. 110 patients reported some sort of 'irritability' between 1 and 10 indicating moderate discomfort and annoying symptoms unlike 'pain'. 41 (25%) patients reported no 'irritability'.

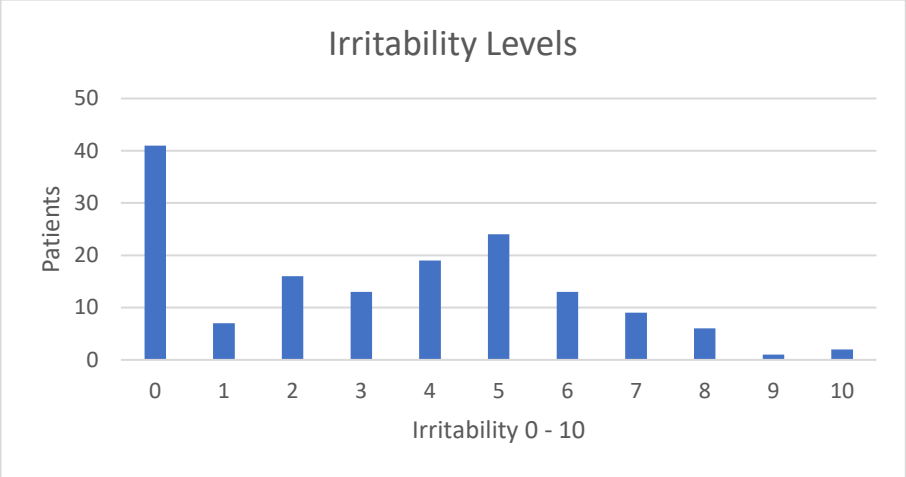

Figure 2: Irritability reported
X-axis: level of irritability 0–10, Y-axis: 0–50 patients

Limb Numbness:
30 (18%) patients reported a limb numbness.
111 (69%) patients reported no limb numbness.
21 (14%) were not identified

Dysfunction
Dysfunction is an expression of how much a person is inhibited in 'normal life activities'.

- 4 patients reported dysfunction level between 3 and 6.
- 110 (67 %) patients reported no dysfunction
- 48 (29 %) were not identified.

Spinal Area Impacted
(as reported by patient at 1st assessment)

Acute vs Chronic Whiplash injury
n=162

- 65 (41%) of acute patients reported cervical spine pain
- 85 (53%) of chronic patients reported cervical spine pain
- 12 (8%) unidentified

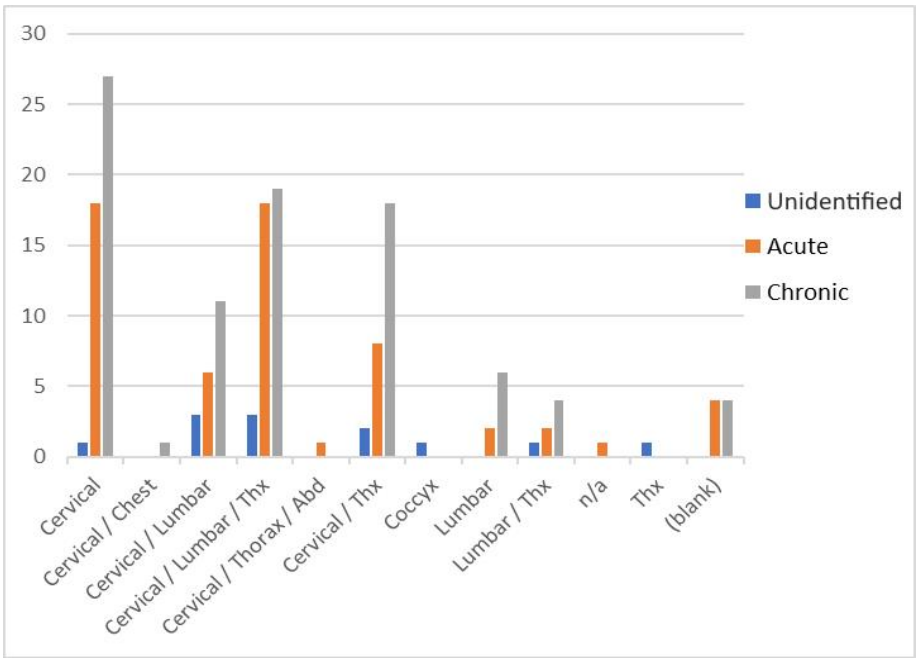

Figure 3: Acute vs chronic

37 (23%) in the **acute** & **chronic** groups complained of a combination of cervical, thoracic and lumbar symptoms at time of assessment. 17 chronic patients complained of cervical and thoracic pain only compared with 9 in the acute group.

Female vs Male

Impact on anatomical areas after whiplash injury comparing females and males (n=162) in %.

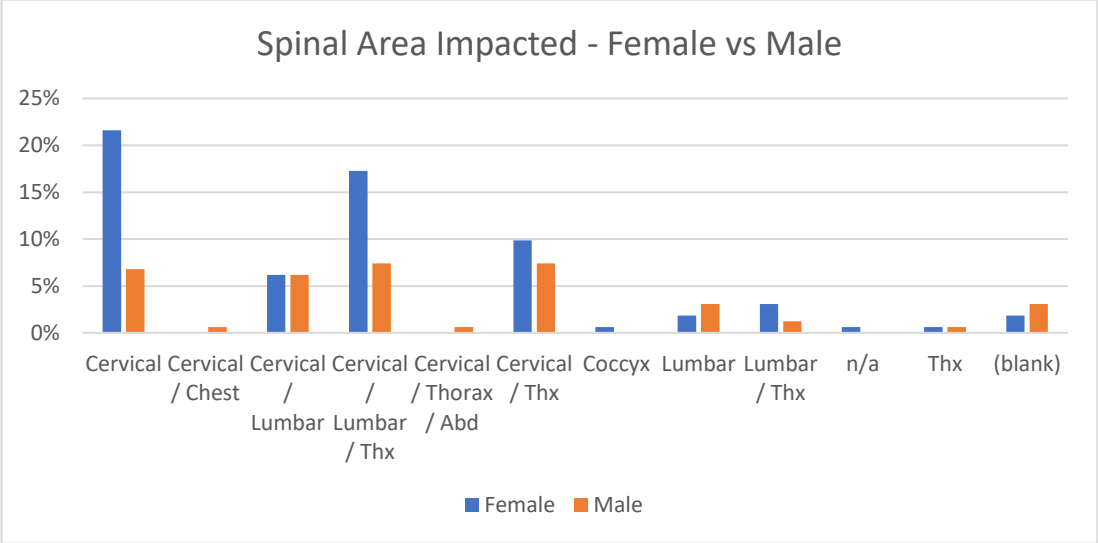

Figure 4: Female vs male

22% of female patients reported their main problem to be in the cervical spine compared with 7% of male patients. 17% of female patients described their main complaint to be a combination of cervical, thoracic and lumbar area of the spine compared with only 7% of males. The male population was evenly shared between spinal areas and less defined.

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Origin of Symptoms
(as assessed by therapist)

a. Arthrogenic
b. Myogenic
c. Neurogenic
d. Osteogenic
e. Psychogenic
f. Other

Arthrogenic Origin:
Symptoms attributed to joint pain

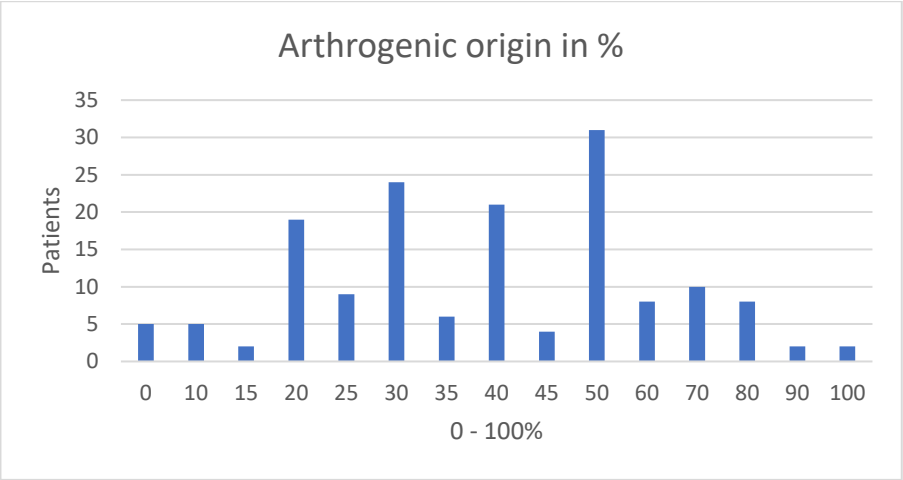

Figure 5: Arthrogenic origin
y-axis: number of patients, x-axis: % of symptoms attributed to joints

In 31 patients, 50% of symptoms were attributed to arthrogenic origins.
Approximately 59% of patients (96) were attributed to have arthrogenic origin of symptoms.

Myogenic Origin:
Symptoms arising from muscles, tendons and soft tissues

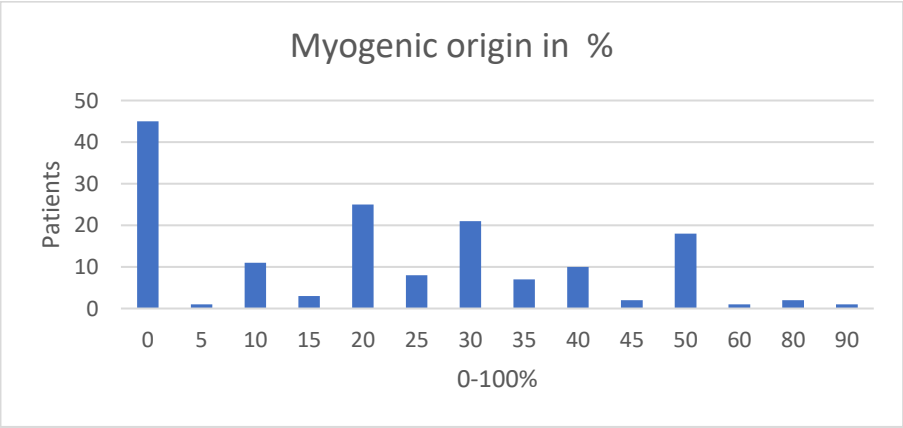

Figure 6: Myogenic origin
y-axis: number of patients, x-axis: % intervals of 5.

18 patients had 50% myogenic symptoms.
45 patients had **no** symptoms originating from myogenic origin (0%).

Neurogenic Origin:

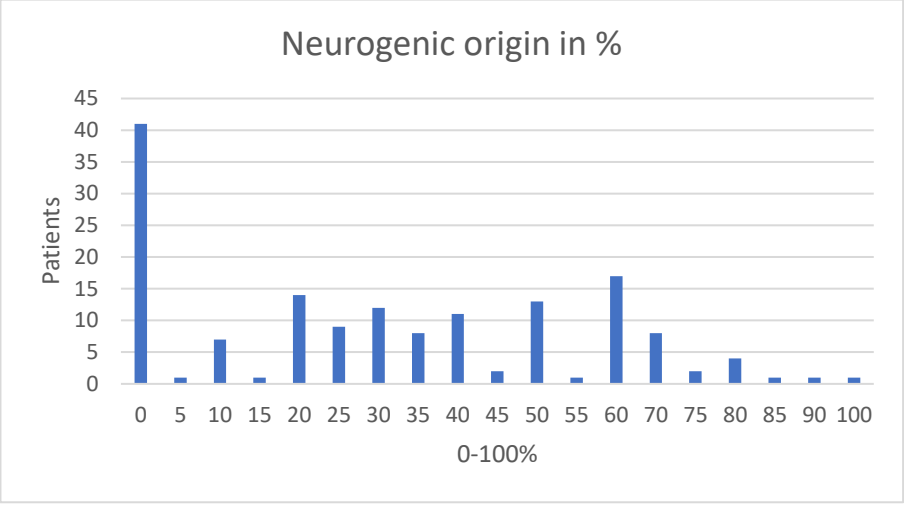

Figure 7: Neurogenic origin
y-axis: number of patients, x-axis: intervals of 5% measuring symptoms attributed to the nervous system

17 (10%) patients had 60% of their symptoms originating from the nervous system. 41 (25%) of patients had no neurogenic origin of symptoms.

Osteogenic Origin:
Symptoms originating from bone tissue

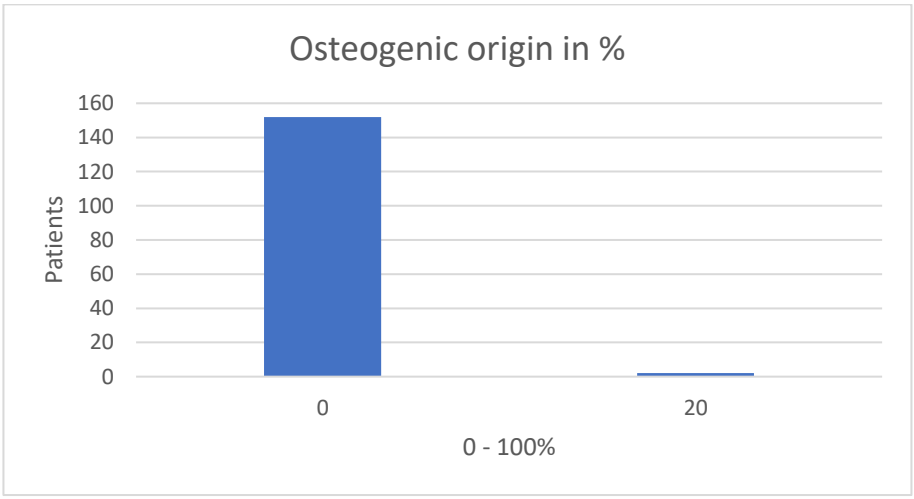

Figure 8: Osteogenic origin
y-axis: number of patients, x-axis: % of symptoms of osteogenic origin

- 152 patients had no bone origin of pain
- 2 (20%) patients were considered to have symptoms originating from bone tissue
- 8 patients were not specified

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Psychogenic Origin:
Symptoms considered to have psychogenic origin

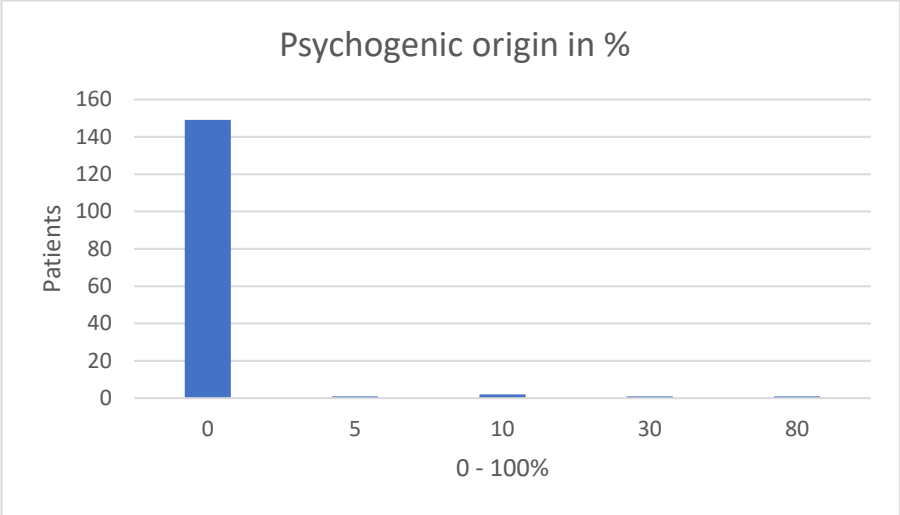

Figure 9: Psychogenic origin
y-axis: Number of patients, x-axis: % of symptoms originating from psychogenic origin

- 1 patient was considered to have 80% psychogenic origin of symptoms.
- 12 patients were considered to have some form of psychogenic origin of symptoms.
- 149 patients were considered to have no psychogenic origin of symptoms.

Other Causes:
Symptoms arising from other reasons not attributed to defined anatomical systems.

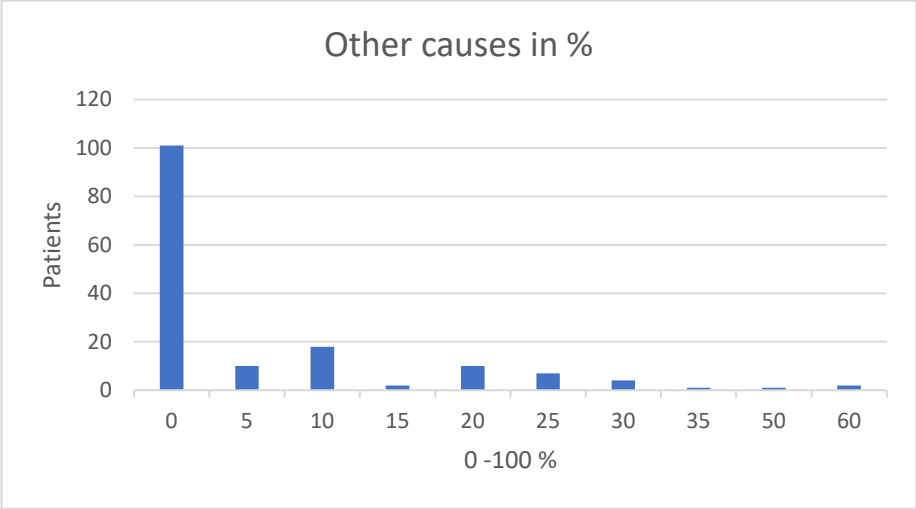

Figure 10: Other causes
y-axis: Number of patients, x-axis: % attributed to other causes

100 patients were not considered to have 'other causes' attributed to their symptoms.
62 patients may have had other causes attributed to their symptoms but those causes were not identified.

TREATMENT, OUTCOME MEASURES, AND RESULTS

Treatment Intervention

Adapted Reflextherapy (AdRx):

AdRx was developed by the author as a clinical method of treatment in the late 1990s to facilitate relief in musculo-skeletal pain disorders including whiplash injury. It is a foot treatment akin to reflexology that gained its own status as a foot therapy under the umbrella of Reflextherapy and a standalone therapy by the Association of Chartered Physiotherapists in Reflex Therapy (ACPIRT) in 2015[7].

The manual therapy is applied to the dermis of the feet. Depth of pressure varies according to chronicity of symptoms. It uses defined treatment techniques on selected areas in relation to sensitivity and painful areas confined to feet and ankles.

The AdRx hypothesis arises from neurophysiology and neuroplasticity events in painful states [8] whereby quality and quantity of proteins change in the axonal flow [9] and from the original teachings of reflexology [10-15].

The main hypothesis assumes that, through touch, a counter-irritant affects higher centres and concomitantly descending mechanisms. The treatment has high specificity and task purpose in its application meaning that only areas deemed related to the source of pain patterns are treated. Reflexology was found to change pain in patients with phantom limb pain [16]. AdRx was found to reduce pain in chronic neck pain sufferers after whiplash in a pilot study [17] and improve outcomes of physiotherapy interventions on whiplash-injured patients including those from a train crash in London 1999 [18].

From a pioneering start, AdRx was found effective in reducing pain and irritability after injury as well as restoring function and daily activities in patients suffering from the effects of acceleration/deceleration accidents. It is hypothesised that tactile input acts as an ascending action potential transmitting a neural stimulus to engage brain tissue for activating a descending response. Although not associated with AdRx per se, Mountcastle uses a narrative to demonstrate neural pathways and reactions where a blind person uses Braille for identification and formation of language [19]. The sensory input from the hand translates into motor functions formulised by brain activity. The advantage of using AdRx in the context of hypersensitivity in whiplash injuries is that patients with hyperalgesia and severe irritation can be treated without touching anatomical painful areas.

Since its foundation, AdRx has become an integral part of physiotherapy practice alongside an orthodox examination of each patient. Findings on the feet are compared with anatomical sites and assessed for accuracy by questioning the patient with regards to present and past injuries. The whole foot examination procedure takes 20–25 minutes. No patient in this cohort declined a foot examination.

Outcome Measures

1. ‘Pain levels’, ‘irritability’, ‘numbness’ and ‘dysfunction’ outcomes are measured and described as a percentage of improvement jointly agreed and approved by patient and therapist.
2. Number of treatments mean, median, mode.

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3. Prediction of outcome after assessment.
4. Previous injury(ies). A record was made of earlier episodes of trauma.

Results

a) Pain levels are included in the percentage of predicted and actual improvement outcomes. See Figure 12, which compares 'acute' vs 'chronic' whiplash patients. 72% (114) of patients achieved the predicted improvement.
b) Number of treatments per patient (n=162)

Table 7: Number of treatments

5.02	Mean
4.5	Median
3	Mode

Table 8: Mean number of treatments

Acute/Chronic	Mean *actual* number of treatments (n=162)
Acute (67)	4.90
Chronic (89)	4.92
Unidentified (6)	6.33
Grand total	**5.02**

Table 9: Mean number of treatments with 'unidentified' removed

Acute/Chronic	Mean *actual* number of treatments (n=156)
Acute	4.90
Chronic	4.92
Grand total	**4.91**

Prediction of Outcome

'Predicted' outcome was an estimated percentage of improvement in a predicted time and estimated number of treatments. **'Actual'** outcome was all the above at time of discharge.
By comparing 'predicted' and 'actual' outcomes it becomes a cost-effective comparison, i.e. the therapist predicts that patient x requires 4 treatments costing a total of £240.00 taking x number of weeks to complete. The actual outcome is that patient x requires exactly that, 4 treatments costing £240.00. The claim for treatment becomes exact and accurate the more the 2 outcomes coincide. This should be of interest to the insurance company.

Predicted Outcomes: Predicted and Actual Number of Treatments:

X-axis is percentage difference between predicted and actual improvement rounded to nearest 5%. Negative numbers indicate that **actual** treatment numbers were better than **predicted,** i.e. the patient needed fewer treatments than was predicted. The majority of estimates are within -5 to +10 per cent accurate. 48 (30%) patients completed their treatment in the predicted number of treatments. 66 (42%) required **fewer** treatments than expected. 19 (11%) achieved **less** improvement than originally estimated. 1 had no improvement (SQ), 5 did not finish (DNF). 12 patients are unidentified.

We wanted to find out whether there was a difference between predicted and actual outcome in the two cohorts: Acute and chronic whiplash patients.

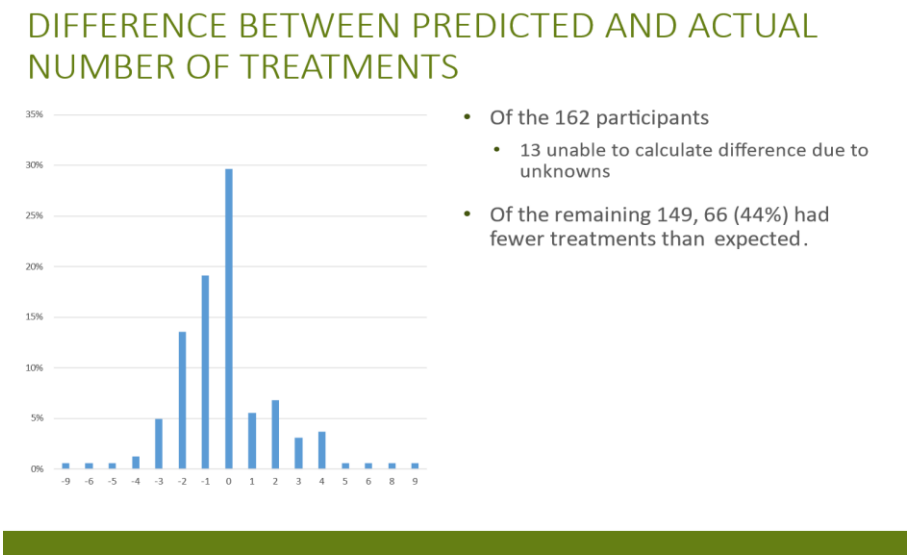

Figure 11: Predicted vs actual number of treatments
Y-axis: patients (n=162)., X-axis: number of treatments

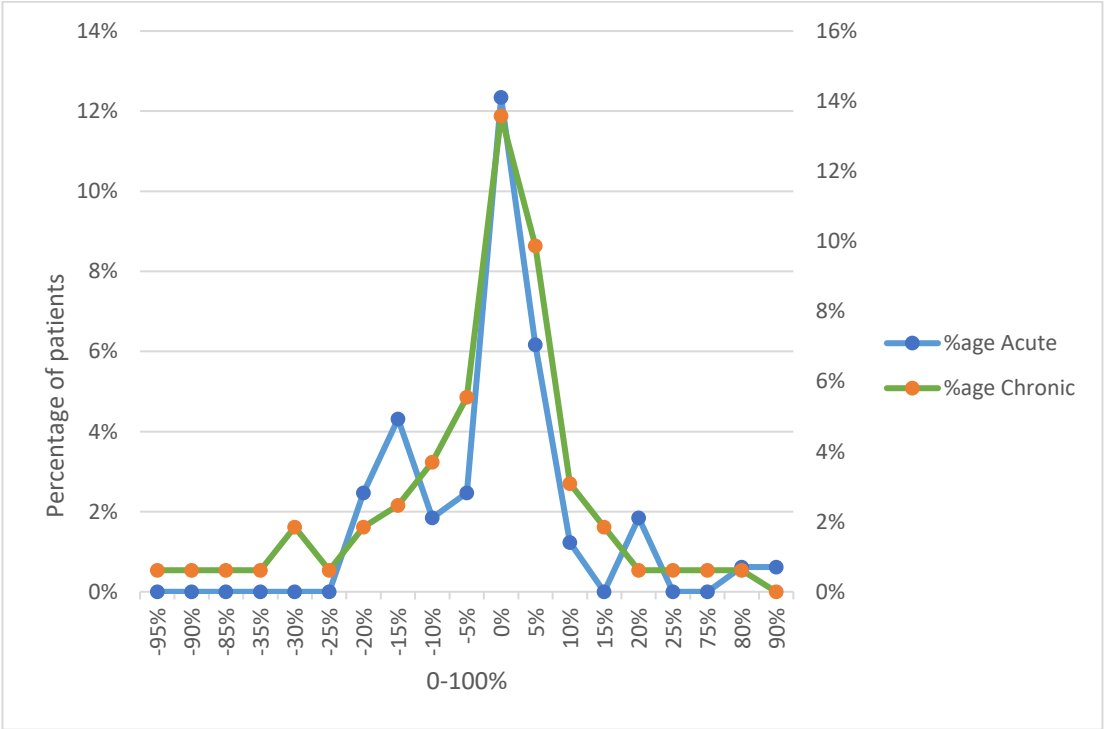

Figure 12: Comparing predicted and actual outcomes in acute and chronic patients

This graph compares 'predicted' and 'actual' outcomes in 162 patients differentiating between Acute (blue) and Chronic (green) condition.

The majority of patients are within -5 to +10 per cent (%) accurate prediction of outcome. Incomplete data has been removed from the chart but included when calculating percentage. % difference is rounded to nearest 5%.

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The blue (acute) and green (chronic) curves are similar in shape indicating no difference between acute and chronic patients in predicted outcomes.

Duration of Symptoms:
We wanted to find out if there was any correlation between the length of time the patient had had symptoms measured in 'weeks of symptoms' and actual outcome.

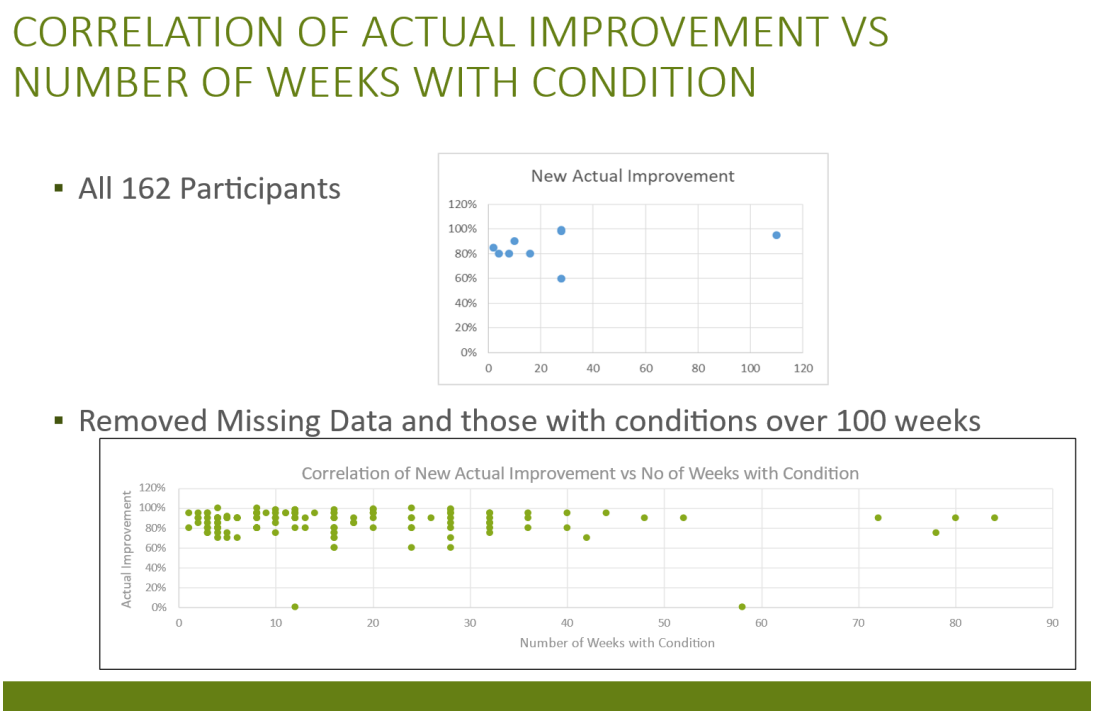

Figure 13: Actual outcome vs weeks with symptoms

Correlation Between New Actual Improvements with Number of Weeks with Condition
The chart indicates that there is no correlation between number of weeks of symptoms (since time from whiplash injury) and the predicted outcome. P-value <0.05 indicates there is some statistical significance.

Recurrence of Whiplash Injury
The actual outcome is compared with the number of whiplash injuries the patient has had in the past.

Correlation: *Recurrence* of whiplash incidents vs *'actual'* improvement

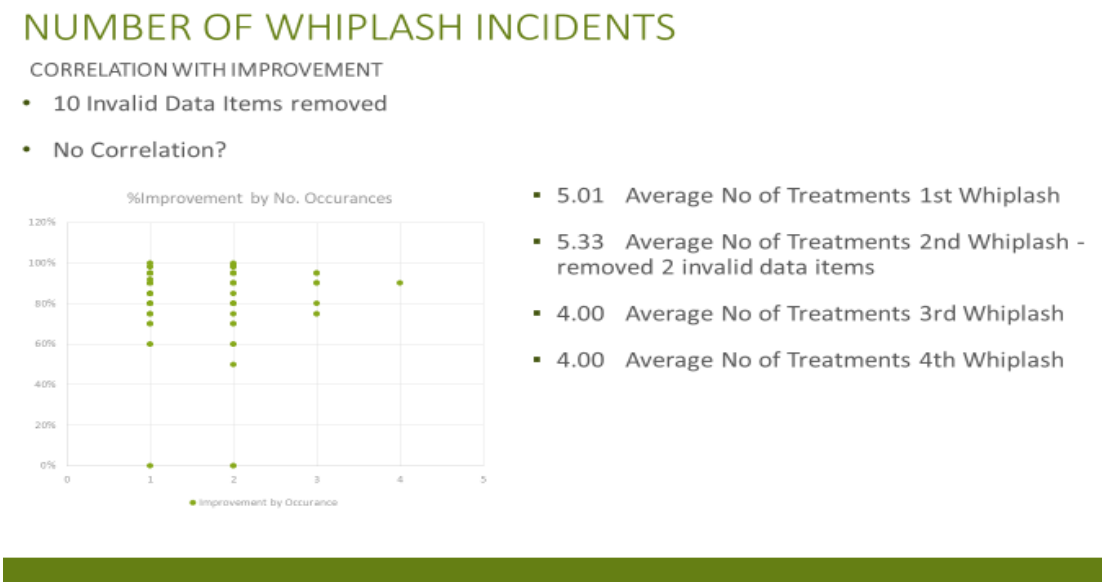

Figure 14: Correlation between number of whiplash injuries and outcome

Summary: Output correlating number of whiplash injuries with 'actual' outcome.

There is no correlation between the *number* of previous whiplash injuries and *actual outcome*. Despite having had 3–4 previous incidents of whiplash, the patient made similar improvement as if they had had one incident.

P-value <0.05 indicates there is some statistical significance.

DISCUSSION

Whiplash injury is a controversial diagnosis with a paucity of effective treatment protocols [20]. The diagnosis often stumbles on the inability to prove cause and effect from a whiplash injury as there is often little to show anatomically except the patient's complaints of pain and discomfort [21]. The mere existence of whiplash injury as a genuine diagnosis after a traffic incident has provoked discussions and juxtapositions of opinions resulting in increased car insurance premiums. A blame game has given rise to an environment of insurance companies and medical sympathies being stretched and defied. Treatment and rehabilitation programmes have been proposed and questioned as to their efficacy relating to the somatic and psychosocial aspects of pain after a whiplash injury without much progress [22, 23, 24].

Non-steroidal anti-inflammatory drugs are helpful to reduce pain in the acute phase but are not able to prevent chronic progression of pain [25]. Yet, 20–50% of patients go on to develop chronic whiplash producing a diagnosis of Whiplash Associated Disorder (WAD)[26, 27, 28].

Attempts were made to avoid development of WAD in 2002 by Waddell G et al. [29] who produced *The Whiplash Book* with intention to be provided in A&E departments in response to 'demand from patients for accurate and effective information and advice' to be distributed at medical outlets for whiplash-injured persons. This was followed by the University of Warwick Medical School Clinical Trials Unit (NOI Conference 2010) stating that a single session of advice from a physiotherapist appeared to be as effective and more cost-effective than a whiplash

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book. In this review, eleven patients had endured symptoms for more than 2 years in addition to the 78 (48%) patients who were considered 'chronic' patients and would in diagnostic terms be associated with Whiplash Associated Disorders (WAD). All patients were treated similarly with the same assessment, treatment intervention and prediction of outcome. Acute and chronic whiplash (WAD) 'before' and 'after' treatment in terms of 'predicted' and 'actual' outcomes were compared. The interest was: 'Did the patient achieve the predicted outcomes?' and 'How did outcomes compare between acute and chronic cohort groups'.

To predict a treatment outcome, it requires a reasoned conclusion as to what extent symptoms can be changed, in what period of time and how many treatments are required to achieve this change. Carrol et al. write: 'The ability to predict a likely health outcome is crucially important in clinical care and health policy development' [30]. Here, the physiotherapist used 'improvement' as a combined measure encompassing all aspects of the patient's condition such as pain, duration of symptoms, irritability of symptoms, limb numbness, dysfunction, psychological status, co-morbidities, general health, medical history, sleep deprivation, time off work, ability to work, and general quality of life measured as a 'percentage (%) of improvement'. It is a subjective conclusion by the therapist in agreement with the patient of probabilities based on reflections on the nature of each of the patient's symptoms and the therapist's clinical experience in relation to treating similar cohorts, knowledge base and trust in her own professional judgement and practice [31].

In the interest of cost-effectiveness, 'prediction of outcome' offers a cost estimate to the insurance company as well as to the individual contemplating a treatment programme. 'Prediction of outcome' includes all possible factors that may facilitate or impede the patient's condition. The key is the reliability of the predicted outcome including number of treatments in proportion to percentage of improvement.

This clinical review presents a plethora of data from 171 'acute' and 'chronic' patients having suffered a grade 0 – 2 whiplash injury resulting from a road traffic accident. 9 patients did not commence treatment at all, hence were excluded from the review, leaving a total of 162 patients included in the review. Each patient was examined as per orthodox musculo-skeletal assessment as well as with a foot examination according to Adapted Reflextherapy principles at first assessment; they were also presented with a predicted prognosis including percentage of improvement in a specific time requiring a predicted number of treatments, e.g. 'I expect you will get 70% better in 8 weeks after having had 4 treatments.' This information was relayed for approval as requested by the insurance intermediary which, in effect, acted as an external assessor in terms of efficacy of treatment. The question was: How predictable and reliable is the physiotherapy input in relation to improvement, cost and durability?

The patients' ages varied from 0 to 89 with the highest number between 30 and 39 years old. As expected, women (103) were more affected than men (59) [32]. with a high incidence in the 30–40-year age category. Women were more affected in the neck region (cervical) and in the combined 'cervical-thoracic-lumbar' areas compared with men. Combining female and men in the acute vs chronic cohort, the cervical area still rates the highest of all the spinal areas. It was striking to note that a large proportion of patients were affected in the thoracic and lumbar regions only. This ought to have a high profile in addressing symptoms.

With regards to occupation, the lack of professional drivers such as taxi drivers, bus drivers or lorry drivers was notable. A high proportion of patients had a sedentary occupation maybe in line with the high proportion of female patients but cause is unknown. Considering 'adherence to an unorthodox treatment' in relation to distance to travel for treatment, most patients travelled 8 miles to the private clinic, 24 patients travelled 6–21 miles and 8 patients agreed to travel more than 30 miles to the clinic. A few of those who did not attend (9) lived too far away to consider attending. 61% of patients had seen a GP, A&E, paramedic, or A&E plus paramedic as the first point of contact; they still needed to be referred eventually for physiotherapy management prompting the question of an urgent educational need among orthodox medical practitioners to have a deeper understanding of whiplash injuries to prevent symptoms from becoming chronic. Only 2 people visited a physiotherapist as the first port of call for help.

Patients who suffer symptoms for 3 months + are likely to suffer from post-traumatic disorder such as whiplash associated disorder, WAD [33]. Patients in this cohort were assigned to the 'acute' (37%) or 'chronic' (56%) (WAD) group determined by weeks of symptoms post injury. 7% were not identified as either acute or chronic. For 31 patients this was their 2nd whiplash injury. Seven people had had 3 previous injuries, 1 person had had 4 injuries, and 1 person reported 5 whiplash injuries in the past. The final outcome in these patients showed no correlation between the number of whiplash injuries in the past and the actual outcome: p-value <0.05. This outcome was unexpected as it is generally thought that previous incidents prohibit recovery and improvement. Duration of symptoms varied from 4 weeks to 468 weeks (9 yrs). Unexpectedly, there was no correlation found between weeks of duration of symptoms and 'outcome': p-value <0.05. In other words, even though the patient had had their symptoms for a considerable time, the recovery time was statistically similar to those who had had their reported symptoms for 4–8 weeks. This finding could potentially have positive implications for WAD patients where it is estimated that 20% end up with persistent pain and symptoms following a whiplash injury [34].

As 54% of the patients in this review had chronic symptoms, psychological distress should be a feature in these patients. Findings from this service evaluation did not underpin this assumption. Outcomes and findings in this review are found to concur with some existing whiplash research but diverge in psychogenic-related symptoms where only a few patients were found to have symptoms originating from psychogenic sources. Only 1 patient was considered to have 80% psychogenic origin of symptoms. The reason for lack of this correlation is unknown but lack of official testing techniques for such variables, physiotherapist bias and other unknowns may be considered as the cause of inconsistency.

Pain levels varied between 4 and 8 in 118 (73%) of patients. This is considered 'moderate' to 'severe' pain. Enduring pain in context of injury 'impairs quality of life, and cause[s] significant physical disability and emotional distress' [35]. Most patients had symptoms of myogenic or neurogenic origin. Ten patients were considered to have pain of osteogenic origin while 31 patients had 50% of their symptoms originating from joint structures. 'Irritability' of tissues determines how easy it is to provoke an unpleasant symptom. It is considered a form of hypersensitivity of tissues which indicates centralisation mechanisms [36]. 121 patients reported levels of irritability varying from 1 to 10 representing 74% of patients suggesting some form of centralisation. 'Numbness' in limbs indicating neural compression is not expected on account of whiplash injury grade 0 – 2. Nevertheless, 27 (16%) patients reported some form

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of limb numbness. It is not clear whether the numbness occurred at time of injury or whether it developed as a subsequent result of the injury or a subsequent injury sometime later. 'Dysfunction' was used to measure how much the whiplash injury affected quality of life in terms of disrupting activities and removing normal movement patterns, for example exercising, ability to carry out daily activities, hobbies, driving and working. 110 (67%) patients reported that they had no dysfunction as a result of their injury(ies). Four patients reported that dysfunction levels were between 3 and 6. In 48 cases, 'dysfunction' was not identified.

Outcomes from the treatments were encouraging. The mean number of treatments was 5.02 including the 1st assessment, which compares with the national average of 3 to 5 treatments for orthodox physiotherapy treatments. The number of treatments was equivalent to the predicted number of treatments, or fewer, in 72% of all patients. Less than a quarter, 31 patients, had 1 to 4 more treatments more than predicted. Treatment beyond the predicted number of treatments had to be approved by the relevant referring intermediary. The median number of treatments was 4.5 and the mode 3.

This paper demonstrates, albeit retrospectively with raw data, opportunities for further research and critical evaluation of simple application of hands-on therapy supported by a previous, more detailed, single case study of a chronic whiplash injured patient having undergone a similar treatment regime [37].

Accounting for non-verified and possibly biased findings, the outcomes are nevertheless of interest. They support findings from research in some areas but bizarrely repudiate the notion that repeated accidents lead to chronicity and irreversibility and that psychogenic origins make up the bulk of patients' symptoms. Patients represented in this review were assessed and treated by one and the same 'Clinical Specialist in Pain' (NHS), a chartered physiotherapist with 45 years' experience in treating musculo-skeletal pain patients with the main aim to assess whether the predicted outcomes at 1st assessment coincided with the actual outcome at time of discharge in WAD patients. No paper has been found assessing predicted pre-treatment outcomes with actual outcome in treatment of grade 0–2 whiplash injured patients. Accounting for bias, placebo effects and lack of protocols, findings from this review throw up potential socio-economic considerations which should be of interest to providers and researchers. The hypothesis of peripheral stimulation is that activation, and ultimately re-organisation, of the neural plasticity occur to encourage higher centres to formulate recovery mode.

Finally, the hypothesis of foot treatment activation: *Neural plasticity re-organisation from injury to recovery mode due to sensory (tactile) input to central areas.*

Summary

This is a summary of a service evaluation in the management of 171 grade 0–2 acute and chronic whiplash-injured patients referred consecutively for physiotherapy management over an 11-year period. The physiotherapy approach introduced an unorthodox treatment named Adapted Reflextherapy (AdRx). A prediction of outcome was estimated in each case resulting in correct estimate and better than predicted outcomes in 72% of patients. The mean number of treatments was 5.02. Allowing for removal of unidentified 'acute' or 'chronic' patients, the mean was 4.91. There was no difference in predicted outcomes comparing acute with chronic whiplash cases. As expected, there was a higher incidence of female patients than men but

unexpected low incidence of identified psychogenic origin of symptoms. A combination of cervical, thoracic and lumbar symptoms was commonly found in both genders.

A majority of patients had a sedentary working habit. Nine out of 171 patients never started or finished the treatment, and of those who did start, no one refused the unorthodox approach.

Data Handling

Data was obtained from clinical documentation carried out by one chartered physiotherapist and formulated by an independent statistical assistant with additional input from a university physiotherapy lecturer in statistical analysis. Data collection was carried out in accordance with patient confidentiality.

Reflection

There is a paucity of references assessing 'predicted and actual' outcomes in whiplash-injured patients. No reference was found. The Chartered Society of Physiotherapy withdrew its support for using reflexology in a professional capacity due to lack of 'emerging evidence' in 2021 [FRONTLINE Vol 27, Issue 5:p28-29, 2021].

Declared Interest

Adapted Reflextherapy has been developed and established as a method of treatment to reduce pain in MSK patients since 1999 by the author. As well as being a member of the Chartered Society of Physiotherapy, she qualified as a reflexologist in 1989 and specialised in pain management developing 'Adapted Reflextherapy' in response to demand and the need to find an alternate intervention to address pain and functional issues in whiplash-injured patients. This demand coincided with treating patients from the Paddington train crash in 1999. Relevant advice and appropriate exercises were applied as per praxis to all patients in addition to AdRx.

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