
Case report

A medico-legal report to a solicitor

L. Gifford

Chartered Physiotherapist in private practice, Falmouth Physiotherapy Clinic, Falmouth, UK

SUMMARY. This is an example of the influence that modern pain science can have on medico-legal reporting. The report has been reproduced with minor changes. These changes have been made so as to protect the identities of those involved and to assist the reader. © 1999 Harcourt Publishers Ltd.

INTRODUCTION

The following report was the result of a request from the patient's solicitors. The patient was involved in litigation following a road traffic accident in April 1996. In the accident, the patient was hit from behind by another car while waiting to enter a roundabout. The patient estimated that the car was travelling at approximately 30 mph. At the time of this report, the patient was 43-years-old and she was employed as a laboratory researcher. Her work took her to Europe and the USA as well as around many universities in the UK.

A key paragraph in the solicitor's letter of request read:

What we need to be able to establish is whether the pain and suffering experienced by the patient is directly attributable to the road traffic accident either in being the sole cause of that pain and suffering or in exacerbating the symptoms of an underlying or pre-existing condition.

REPORT

Previous history including relevant past medical details and treatments

From the treatment records the following was noted:

- Train accident in 1979 – the patient banged her face resulting in neck pain. This was treated with physiotherapy.
- The patient is a long-standing diabetic.

- The patient has had minor speech problems for 20 years. The onset was sudden and for no apparent reason. Investigations at the time were unrevealing. The patient has had speech therapy.
- December 1987 – the patient fell backwards and fractured her right wrist.
- Head tremor started in February 1989. A neurologist in the USA diagnosed it as 'benign familial tremor', but the patient noted no family history of the problem. The patient had a brain scan to investigate the tremor in 1996. The result was negative and the specialist commented that there was nothing that could be done from his perspective.
- First seen by the author in September 1989 – the patient complained of a 2 month history of right-sided neck pain and neck tremor. The patient also complained of soreness in the right forearm spreading to the fingers of the right hand, paraesthesia in the right thumb tip and some right-sided head pain. The patient thought that the problem might have been precipitated by a hypoglycaemic episode in April 1989, during which the patient collapsed and fell against a toilet bowl. On examination, neck movements were painful at end of range. Neurological tests were normal. Palpatory testing of tissues underlying the painful areas showed enhanced sensitivity. Neural tension testing of the right upper limb nerve trunks and roots also revealed enhanced sensitivity (see Butler 1991; Gifford 1997). Treatment over a period of 4 months produced a steady reduction in pain intensity and the patient reported that the tremor and speech also improved.
- The patient consulted the author again in November 1990, complaining of a spontaneous

L. Gifford, MAppSci, BSc, MCSP, SRP, Falmouth Physiotherapy Clinic, Kestrel, Swanpool, Falmouth, Cornwall TR11 5BD, UK.

onset of backache in the mid lumbar spine, abdominal muscle ache and altered sensation. At that time the patient said that her neck had been fairly good but that she did have some right wrist pain. Symptoms varied over the treatment period. In mid December, the patient complained of right hand problems again. Symptoms included pain and paraesthesia in the fingers, difficulties with writing and some pain between the shoulder blades. On examination, tightness and pulling on the right side of the neck with movements to the left were recorded. There was also tightness in the right sternocleidomastoid muscle of the neck and a significantly pain restricted upper limb neural tension test on the right side.

- Consulted June 1991: The patient complained of low back problems, with a feeling of displacement, not being straight, and local back discomfort. No injuring incident occurred but the patient had been sitting a lot while travelling. Some right wrist pain still occurred, for example, following typing. Spinal movements were painful on side bending to the right and left and the tissues around the spine were hypersensitive to palpation. Treatment was directed to her back and right wrist problems.
- Consulted September 1991: The patient complained of low back and pelvic alignment abnormalities. The author's records indicate that the patient's wrist and neck were completely fine but the tremor and speech problems were still apparent.
- Consulted April 1992: The patient reported having been involved in a road traffic accident in November of 1991. The patient had been hit from behind while stationary. The patient complained of neck soreness especially at the base of the neck around the C7 spinous process. The patient mentioned right arm symptoms in particular pins and needles in the tips of the fingers. Some pins and needles were present in her arms, also. The patient had come for treatment because the pins and needles had been getting worse in the previous week.
- Consulted July 1993: History of two road traffic accidents. In April the patient had swerved off the road and hit a tree and the car was a write-off. Then, the patient mentioned having symptoms between her shoulders that took 1 month to settle. Also, on 22 July (1 week previous to her visit to the author), the patient was involved in another rear end collision and was shunted two car lengths forwards. At the time of initial examination the patient complained of pain across the base of her neck spreading bilaterally towards both shoulders. The patient also complained of back pain, and right lower arm pins and needles and wrist stiffness. Some pins and needles occurred in the left arm too.
- Consulted April 94: The patient complained of pins and needles following a lengthy car journey.

- Consulted July 94: The patient complained of right wrist problems and paraesthesia in her right hand.
- Consulted September 1998: This consultation was in relation to the current problem stemming from the most recent road traffic accident. The history of this is outlined below.

CURRENT HISTORY

The patient was involved in a road traffic accident on 20 April 1996. Her car was hit from the rear. Immediately following this the patient suffered bad headaches and nausea. The patient felt that she had suffered damage at the base of her skull. The patient also had lingering neck pain and pins and needles that had lasted for 12 months. The patient said that the symptoms merged with a torticollis (neck deviated to right) problem which started in February 1997. The torticollis became progressively worse and she was referred to orthopaedic and neurology specialists. The patient was prescribed a collar.

The patient told the author that a specialist neurologist had diagnosed dystonia in relation to the neck torticollis. It seems that no adequate diagnosis has been given for her condition and that no one has been happy to relate its onset to the underlying injury sustained following the accident in April 1996. There is also some confusion and disagreement between specialists as to whether the 'diagnosis' is torticollis or dystonia. This is discussed below.

PROBLEMS

The following problems were reported and noted during the author's examination in September 1998.

Symptoms/complaints

- Pain on the right side of the neck spreading to the right shoulder blade.
- Some mid thoracic pain.
- Some low back pain.
- 'Cramp-like pain' and sensation of pressure on the right anterior aspect of the neck (overlying the sternocleidomastoid muscle on the right).
- 'Neuralgia-like pain' over the right side of the face. The patient described it as a stinging or burning sensation.
- Headaches on the right side of her head every morning, worse when sitting up.
- Difficulty moving neck and difficulty holding it anywhere near normal posture due to pain.
- Head constantly held to the right. Marked torticollis, i.e. head markedly deviated to right

by neck spasm – notably in the sternocleidomastoid muscle on the right side. The patient wore a soft collar most of the time to help manage the problem.

- Disturbed sleep due to pain and an inability to lie on right side.
- The patient was, and still is, very concerned that something serious has been overlooked or not found that would account for her problems. The patient feels that she may have broken a part of her neck and that this has not properly healed.
- The patient was, and still is, not happy with the quality of examination and investigation that she has undergone by the medical specialists. For example, the patient has been told that her head tremor is not ‘organic’.
- The patient is unhappy that she has not had a scan since her head deviation began and she is very concerned about the problem and its cause.
- The patient is unhappy with the clinical diagnosis of dystonia (discussed below) and is also unhappy that the specialists seen have made no comment about any relationship between her current state and her previous injuries. The patient feels that the medical specialties are colluding and that they are inclined not to give her problem any validity.
- The patient finds the level of pain and the continuing problems that accompany them very distressing.

Symptom behaviour

- Almost constantly aware of problem – does have some occasions with no symptoms.
- Varies day-to-day – good and bad days.
- Takes analgesia to control the pain and this medication includes coproxamol and ibuprofen.

Activity levels/function/work related problems

All her normal activities have been curtailed due to the problem:

- The patient has been forced to give up country dancing and swimming.
- The patient can only walk her dog for a maximum of 15 minutes – formerly happy to do a 6 mile ‘hike’.
- The patient has had to employ someone to help with housework, shopping and gardening – all activities that she was quite independent with prior to the 1996 accident.
- The patient has difficulty shopping, for example she is given help at the checkout to pack her groceries and then to lift them into the car. The

patient has to use a small trolley rather than a large one.

- The patient has not worked for a full week since April 1997 as a result of her problem. Due to her head posture and the pain, she is unable to look down a microscope or perform some of the lifting tasks involved in her work.

Examination findings

In the physical examination the following findings were recorded:

- Marked deviation of the head to the right, the neck being in right side flexion with some left rotation – there was very obvious spasm in the right sternocleidomastoid muscle. The neck posture looked like that of a classic torticollis (discussed below).
- There was a marked head tremor, which was worse when the collar was taken off. This was far stronger than on previous visits.
- Movements of side flexion to the left and rotation to the right were impossible for her to perform and very pain provocative. All the other movements lacked full range. Extension was not in the normal mid plane – it deviated to the right. Flexion was somewhat better in that her head came to the mid line.
- Moving the head passively lying down, with her head resting on a pillow, it was possible to achieve more range (typical of all torticollis problems). However, full range passive movement was nowhere near possible, especially of left side flexion and right rotation. The mid cervical intervertebral joints seemed particularly blocked by pain and provoked very sharp and intense muscle spasm.
- It was possible to get her neck to neutral with both arms raised above her head.
- Upper and lower limb reflexes, as well as proprioception, were normal, thus indicating an absence of any significant upper motor neurone/central nervous system problem.
- Sensory testing for light touch and pin prick were normal in all four limbs.
- Palpation of neck tissues underlying the area of pain revealed marked tenderness.
- Neural tension tests revealed enhanced sensitivity in the right arm.

OPINION AND DISCUSSION

The following is the substance of the report by the author to the patient’s solicitor.

In the request for this report from the solicitors, it was stated:

What we need to be able to establish is whether the pain and suffering experienced by [the patient] is directly attributable to the RTA either in being the sole cause of that pain and suffering or in exacerbating the symptoms of an underlying or pre-existing condition.

It is clear that the patient is suffering from a chronic pain condition following a whiplash injury on 20 April 1996. Her road traffic accident at that time was clearly the start of her current ongoing pain problems. However, previous accidents and previous pain conditions need to be taken into consideration. There is also a need to discuss the nature of torticollis and dystonia and whether her current severely disabled presentation relates to her history of pain and trauma or is of some other cause.

Overview of important aspects of whiplash associated disorder

Whiplash is not a pleasant injury to suffer from as the problem is never resolved in many sufferers and many go on to suffer ongoing high levels of pain, as well as often having problematic physical and psychological consequences if inadequately managed. The percentage of whiplash injury victims that go on to become chronic sufferers shows a marked variation between studies carried out, i.e. it varies between a low of 12% and a high of 86% (Croft 1997). The great variation is most likely a result of the variation in the post-accident outcome screening process rather than a variation in the amount of symptoms. In other words it is highly likely that the majority of people do go on to suffer some kind of ongoing discomfort, it is just that it affects some people far more severely than others. It is likely that approximately 10% of whiplash injured remain relatively permanently severely disabled by the pain (Croft 1997).

Most of the current literature on whiplash reports that those patients destined to recover will generally do so in the first 2–3 months after injury. This does not mean that most patients ‘heal’ within this period and that symptoms going on for longer than this period should be viewed with scepticism.

Following this 8–12 week period, however, it is highly likely for symptoms to persist indefinitely (for review of the literature, see Barnsley et al. 1994). These authors and world authorities also categorically state that:

Clinical, animal, cadaver and post-mortem studies have demonstrated that the cervical zygapophysial joints, intervertebral discs, muscles and ligaments can be seriously injured in such accidents without necessarily producing clinical or radiological signs.

This is mentioned because many patients suffering from whiplash-type injuries, who have ongoing pain, are often directly or indirectly blamed for maintaining their symptoms for gainful purposes, especially if there is no clear-cut evidence of any lesions on standard tests and/or if the symptoms are out of all proportion to the physical findings. Many authors have shown, in controlled studies, that there is not a direct causal link between chronicity and litigation/compensation claims (Thacker 1998). It is recognized, however, that the legal process itself is a secondary stress that can be very unhelpful for the sufferer.

Pertinent to this patient is that it is highly likely that whiplash injury to necks that have pre-existing degenerative changes or had previous problems/injuries/pain states are more vulnerable and therefore have the potential to become persistent pain problems to a much greater extent. A previous history of pain is a recognized predictor of a poor outcome. According to the high quality research of Croft (1997), pre-morbid spondylosis, headaches, or neck pain are significant risk factors for chronicity. This patient has had previous pain problems over quite a number of years, that include head and neck pain.

The issue of deciding whether a problem can be categorized as ‘chronic’ is quite clear – ‘acute pain is usually defined as being of less than 3 months’ duration (Waddell 1998). Waddell (1998) points out though, that, ‘In terms of clinical progress and the risk of chronicity, 6 weeks may actually be a better cut-off’. The patient has now had her problem for nearly 3 years. Her prognosis for complete recovery is therefore bleak and one that unfortunately becomes progressively worse as time goes on.

Also, in relation to ongoing problems and poor prognosis from a tissue perspective, the literature shows that even minor injuries to a disc result in quite dramatic degenerative changes in the months that follow, and the discs certainly do not heal once they have been injured (Gifford 1998). It should be noted that most musculoskeletal tissues heal by repair not regeneration. This means that muscles, tendons, ligaments and cartilage that have sustained an injury are never the same again because they heal by scar tissue formation. It is not unreasonable to argue that abnormal and weakly healed tissues have the potential to remain sensitive and cause pain to a greater or lesser degree.

Pain science is now amassing experimental evidence to support the organic basis of chronic pain, regardless of whether signs of physical impairment are thought to fit or not fit with the ‘evident’ tissue injury. While the original lesions for a whiplash patient may be in the tissues of the neck, the legacy and the central focus of ongoing pain pathobiology in the literature, is on altered central nervous system excitability and altered central nervous system processing of normal inputs (Wall & Melzack 1994;

Gifford 1997; 1998). Thus, the mechanisms that produce the pain change and move with time – and for those that develop marked and severe chronic pain states the pain is said to be ‘maladaptive’ in nature. This means that it serves no productive purpose in protecting the tissues concerned, which have long since done their best to heal anyway. Its most powerful impact is on the life and happiness of the patient – causing much distress, loss of physical confidence, loss of self-esteem, often powerful feelings of guilt and a sense of hopelessness and despair. Many chronic pain patients become clinically depressed, or demonstrate signs of clinical depression (reviewed in Gatchel & Turk 1996). Coexistent with the psychological sequelae of ongoing pain are often general health problems that can be associated with dulled or weakened immune profiles (Ader et al. 1991).

What occurs in the ongoing pain state is a situation where healed tissues (via scar tissue repair mechanisms) still remain excessively sensitive and where many normal tissues also become capable of provoking pain sensations. Thus, many tissues may be quite normal but their input into the central nervous system is processed in terms of pain rather than normal sensation (for summary of recent literature and overview, see Gifford 1997; 1998; Gifford & Butler 1997).

The informed literature is focusing attention on chronic pain in terms of an illness rather than a disease. This has important implications because a key result of this new focus is greater emphasis on the suffering and disability caused rather than the actual physical impairment that the traditional medical model has to confirm as being present before the condition is given any legitimacy. The medical model/impairment based approach is one that is fraught with difficulties with assessing a ‘source’ of pain (Loeser & Sullivan 1995).

In a recent international conference dedicated to the whiplash phenomenon, Arthur Croft, a world authority on whiplash, from the Spinal Research Institute in San Diego, said:

A significant number of medical specialists who frequently treat or examine CAD (cervical acceleration deceleration injury) patients (nearly half of surveyed orthopaedic surgeons in the USA) believe that long-term pain and suffering is more the result of secondary gain, psychiatric disorders, or socio-economic stress.

He went on to say, ‘there is little basis for this hypothesis. One orthopaedic surgeon was so convinced of the trivial nature of whiplash that he volunteered to sit in a car that was struck from the rear by another car at 10 and 20 mph. Six months

later he confided to a colleague that his neck still bothered him’ (Croft 1997).

Long-term follow-up studies appear to consistently show that a very high percentage of whiplash sufferers still complain of symptoms many years later. For example, two studies of patients followed-up for an average of 10.8 years revealed that 86% of the subjects still had pain (Norris & Watt 1983; Watkinson et al. 1991). There is also evidence to show that the prevalence of degenerative changes in patients in their 4th decade who have had a whiplash injury is 3–4 times greater than in controlled populations (Norris & Watt 1983; Watkinson et al. 1991).

Without doubt, ongoing unrelenting pain that escapes an adequate explanation and diagnosis and whose legitimacy is challenged is distressing, disabling and the cause of much suffering. The mature literature on chronic pain states, powerfully avoids using psychological status as a tool to use in order to blame the patient for their condition. However, psychological status and health beliefs strongly contribute to the level of physical disability (Gatchel & Turk 1996). Pain is distressing and high levels of distress do not help recovery, are likely to maintain tissue unhealthy behaviours, and may ultimately play a part in maintaining a low or weak physiological profile that inhibits reasonable recovery and normal coping mechanisms. The science of psychoneuroimmunology testifies to the importance of psychological well-being to recovery and fitness of the immune system, for example (Ader et al. 1991).

It has been proposed that the mechanisms of many ongoing or chronic pains be likened to neurobiological processes similar to those of memory (overview in Gifford 1998, chapter 4). The implications of this are that the biological representation of the pain has largely become detached from the tissue injury where it originated, and that the pain ‘memories’, like any memory, are hard to eradicate and the longer they continue, the more difficult they are to overcome.

Many patients with ongoing pain states exhibit excessively enhanced sensitivity to movement and posturing as well as suffering from ongoing and unrelenting pain for no apparent reason. Thus, gentle movements that are normally not painful become excessively painful (mechanical allodynia) and movements that normally produce minor strains and stretching sensations produce excessive pain (hyperalgesia) (for definitions, see Merskey & Bogduk 1994).

Patients in chronic pain states also suffer from an excessive pain amplification response and spread of pain to physical movements/activities and testing procedures. The pain response often increases with repetitions of a movement or test (the windup phenomenon) and it often continues for many hours or days afterwards. In this sense the relative

'reactivity' to physical stresses is way out of proportion to the movements or tests performed or the evident tissue damage. The term 'hyperpathia' is generally used by the International Association for the Study of Pain (IASP) to characterize this type of pain response and pain behaviour. Again, this evidence and understanding of chronic pain sees it in terms of abnormal neurobiology, rather than abnormal tissues where the pain is felt. This strictly refocuses attention away from tissues as culpable (Gifford 1998). This patient demonstrates all of these reactions to physical testing and day-to-day physical activities.

The significance of past injuries and pain states

It should be clear from the above discussion that past injuries and past pain states predispose the individual to vulnerability to future problems. This needs to be looked at in two ways. Firstly, if previous injuries have occurred, tissue weaknesses are likely to remain and degeneration has the potential to be faster than normal – the tissues themselves are therefore vulnerable. Secondly, long-term neural sensitivity changes or 'memory' throughout the whole nervous system, may remain after the recovery of an injury. As such this means that further injury may easily re-ignite past neural representations and past neural activity of pain and symptoms related to the same, or closely related, tissues. The patient has had previous injuries and several prolonged episodes of neck pain and arm symptoms as detailed above. These have to be seen as relevant to the nature and chronicity of her current problems. The important point to remember is that since this most recent accident and episode, her pain and suffering have been far more intense, far more prolonged and far more disabling than any previously. It may also be worth noting that painful neuropathies are often associated with diabetes (Dyck & Giannini 1996). Thus, diabetics may be more prone to pain states whose origins stem from injuries to nerve tissue.

Torticollis and dystonia

Torticollis

This term is defined as: 'a contraction, often spasmodic, of the muscles of the neck, chiefly those supplied by the spinal accessory nerve; the head is drawn to one side and usually rotated so that the chin points to the other side.' (Spraycar 1995).

The patient clearly has a 'torticollis' or 'wry neck' deformity. The only problem with this as a diagnosis is that it represents a clinical sign, not a cause. Clinically, torticollis is typically present in response to a pain state and hypersensitive joint related tissues of the mid and upper cervical spines. Classically, the neck is deviated away from the painful side.

Dystonia

This term is defined as 'a state of abnormal (either hypo- or hyper-) tonicity in any of the tissues (Spraycar 1995). Basically, it means increased or decreased tone of the muscles, yet again a clinical sign not a diagnosis. The patient clearly has dystonia – hypertonicity (increased tone) of neck muscles.

Discussion relating to torticollis and dystonia

Reflex increase in muscle tone may occur as a result of:

1. Tissue damaging forces.
2. Painful stimuli.
3. Fear/anxiety. This may relate to pain and movement. For example, fear of creating pain or fear of injury.
4. Central nervous system pathology – as in stroke, cerebral palsy, Parkinson's disease, and minor and major brain injury states.

This last category often produces 'spasticity' and loss of control of normal patterns of movement. Movements are often gross, characterized by tremor and inaccuracy and very difficult for the individual to control. This patient does have a degree of long-standing tremor and speech dysfunction (see above). However, brain scans have not revealed any lesions to the author's knowledge.

Judgement needs to be cautious. The tone increases are marked in her neck and the spasm pulling her head to the right is very powerful and difficult to stop when passively handling her neck in lying. Pain provokes this strong spasm. Even though scans are clear, this does not rule out the possibility of some modest and as yet undetectable central nervous system dysfunction resulting in loss of control of a muscle reflex pattern, which can be provoked powerfully into action by a pain response.

A final point regarding the relationship of the neck posture and spasm to the road traffic accident. Most people who are confronted by severe pain adopt postures that are least likely to cause pain and that produce most comfort. The torticollis posture is a relatively common one adopted in acute neck pain of a variety of causes that are not fully understood. Some authors attribute it to synovial impingement or meniscal entrapment disorders in zygapophyseal joints (Grieve 1988). These conditions are of sudden onset and of a few days' duration in most cases. It is the author's experience not to have seen one of such long duration as this patient's or to know of any reference to it in the known literature. It might be worthwhile carrying out a search of the medical literature on this subject.

For the patient, this posture may have developed insidiously in response to neck pain and the

avoidance of it. The patient may be more vulnerable to its development due to her pre-existing problems, e.g. the long-standing neck tremor and the possibility of some sub-clinical central neurological disorder affecting motor control.

CONCLUSION

In response to your question about pain and suffering from the accident I hope you can see that this report strongly supports and provides evidence for the stance that it has powerfully contributed to it. It also states that the patient's previous pain and neck injuries/problems predispose to a poor outcome and contribute to the current condition. However, had the patient not had the most recent accident she would not have the long-term and severe disability she has today. It is highly likely that she would have continued to experience odd spells of far lesser problems related to her earlier history. It seems quite possible that the dramatic and chronic torticollis posture that the patient has is related to the level of pain and sensitivity of the tissues of the neck. Some of the abnormal tone may be due to central nervous system dysfunction of unknown and as yet undetectable origins. The opinion of a specialist physiotherapist in neurological disorders may be worth obtaining.

Her future prognosis at this stage does not look very encouraging. Reference to the literature reviewed suggests that the patient is likely to be a long-term pain sufferer. It is well known that the longer a pain problem exists, the less helpful medical and passive therapeutic interventions are. Best outcomes for chronic pain problems are achieved using modern pain management strategies that involve functional recovery, increasing fitness and cognitive behavioural strategies to improve coping (Flor et al. 1992).

References

- Ader R, Felten D L, Cohen N (eds) 1991 Psychoneuro-immunology, 2nd edn. Academic Press, San Diego
- Barnsley L, Lord S, Bogduk N 1994 Whiplash injury. *Pain* 58: 283–307
- Butler D S 1991 Mobilisation of the Nervous System. Churchill Livingstone, Melbourne
- Croft A C 1997 Whiplash prognosis and outcome studies. International Whiplash Conference Proceedings, Bristol, pp 117–138
- Dyck P J, Giannini C 1996 Pathologic alterations in the diabetic neuropathies of humans: a review. *Journal of Neuropathology and Experimental Neurology* 55(12): 1181–1193
- Flor H, Fydrich T, Turk D C 1992 Efficacy of multidisciplinary pain treatment centers: a meta-analytic review. *Pain* 49: 221–230
- Gatchel R J, Turk D C (eds) 1996 Psychological Approaches to Pain Management: a practitioner's handbook. Guildford Press, New York
- Gifford L S 1997 Pain. In: Pitt-Brooke J (ed) Rehabilitation of Movement: theoretical bases of clinical practice. WB Saunders, London, pp 196–232
- Gifford L S (ed) 1998 Physiotherapy Pain Association Yearbook 1998–1999. Topical Issues in Pain. Whiplash - science and management. Fear-avoidance beliefs and behaviour. NOI Press, Falmouth, ch 2–5
- Gifford L S, Butler D S 1997 The integration of pain sciences into clinical practice. *Hand Therapy* 10(2): 86–95
- Grieve G P 1988 Common Vertebral Joint Problems. Churchill Livingstone, Edinburgh
- Loeser J D, Sullivan M D 1995 On sorting out the crocks. *Pain Forum* 4(2): 132–133
- Merskey H, Bogduk N 1994 Classification of chronic pain. IASP Press, Seattle
- Norris S H, Watt I 1983 The prognosis of neck injuries resulting from rear-end vehicle collisions. *Journal of Bone and Joint Surgery* 65B(5): 608–611
- Spraycar M (ed) 1995 Stedman's Medical Dictionary, 26th edn. Williams & Wilkins, Baltimore
- Thacker M A 1998 Whiplash – is there a lesion? In: Gifford L S (ed) Physiotherapy Pain Association Yearbook 1998–1999. Topical Issues in Pain. Whiplash – science and management. Fear-avoidance beliefs and behaviour. NOI Press, Falmouth, pp 27–43
- Waddell G 1998 The Back Pain Revolution. Churchill Livingstone, Edinburgh
- Wall P D, Melzack R 1994 Textbook of Pain. Churchill Livingstone, Edinburgh
- Watkinson A, Gargan M G, Bannister G C 1991 Prognostic factors in soft tissue injuries of the cervical spine. *Injury* 22(4): 307–309