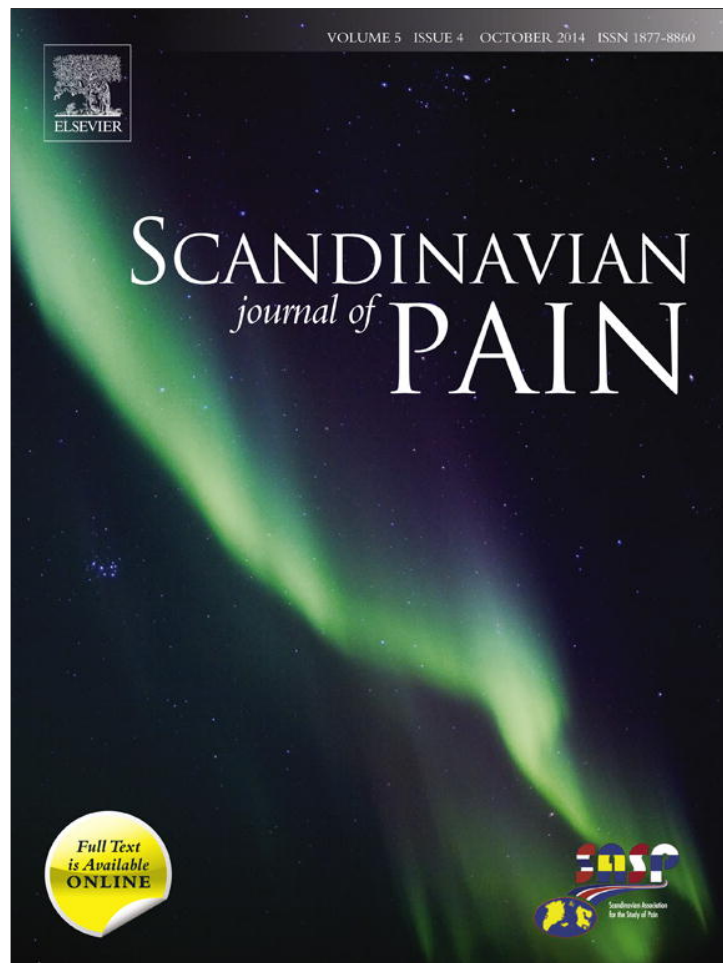


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## Editorial comment

## The whiplash enigma: Still searching for answers

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This issue of *Scandinavian Journal of Pain* presents a study by Styrke and colleagues on the long-term effects of whiplash trauma [1]. The authors describe the complexity of persisting problems after trauma to the neck as well as the methodological difficulties in studying the heterogeneous patient group afflicted with the problems.

Neck pain has likely been present throughout the history of mankind due to the precarious construction of the human frame in an upright position, with a proportionally large and heavy head perched upon a relatively weak neck. The problem became endemic with the introduction of mechanized transport, first by train and then passenger car, with the first report on whiplash trauma published in 1867 [2]. Currently, one will find more than 3300 papers on PubMed using “whiplash” as a search criterion, but, despite such research efforts, in some respects we are still fumbling in the dark. In this editorial we present some thoughts about why, nearly 150 years after the first published article, we are still searching for answers about fundamental questions concerning “whiplash”; such as what it is, and what can be done about it.

### 1. The neck is a complex structure

Part of the explanation for ongoing controversy in our understanding of whiplash injury is the complexity of function of the neck. The cervical spine and surrounding soft tissues not only support and move the head, they have proprioceptive functions that are coordinated with vision, hearing and balance, as well as providing the mechanical home for chewing, swallowing, breathing and speech. Of course, the neck also houses all the blood vessels to and from the brain, the spinal cord, the cervical nerve roots, and the brachial plexi.

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So, the first consideration to beginning to understand the phenomenon of whiplash trauma and the injuries that result from it, is that the part of the body most affected is anatomically complex, with many functions squeezed in to a relatively small anatomical space. Thus, trauma to the neck and the subsequent sequelae can affect structures and functions that have significant impact on global function in daily life, a fact that Styrke et al. describe in their paper [1].

### 2. “Whiplash” is an inadequate description of neck trauma sequelae

A second major issue is how nomenclature can become a barrier to further understanding. The term “whiplash trauma” is easily defined [3], but what is really a “whiplash injury”? And what do we mean when we use the term “chronic whiplash injury” or “chronic whiplash-associated disorder”? These questions were raised at a recent IASP Scientific seminar in Aarhus, Denmark, and although the problem was recognized, no consensus was reached. “Whiplash” as a pathologic entity is used to describe everything from temporary mild neck pain to chronic severe head, neck, and upper back and upper extremity pain and other symptoms, as well as a myriad of neurologic manifestations (dizziness, alterations in visual acuity, etc.), generalized pain, sleep disorders, psychological distress, inter alia. The word “whiplash” is a wholly inadequate descriptor for the wide variety of conditions associated with it.

### 3. Accurate prognostic indicators and effective treatment algorithms are elusive

A third issue that complicates our understanding of injuries following whiplash trauma is the fact that most individuals injured in traffic crashes do not end up with persistent pain or disability. Further, there is a lack of validated and accurate prognostic tools for early identification of patients at greatest risk for the development of chronic symptoms, but also a need to develop clinically useful treatment algorithms for interventions that can be used in different health care systems.

#### 4. Insurers have a financial interest in disputing the presence, extent, and cause of injury

A fourth issue relates to the opposing economic issues present in a system in which the injuries and disability of the patient are often a result of the negligent conduct of another person, which results in the involvement of insurance companies and their attendant financial clout. The competing interests of the patient versus the insurer results in technically sophisticated arguments disputing causal determinations made by treating physicians [4], and forces clinicians to function in the uncomfortable gap between medicine and law [5].

#### 5. There are a number of methodological issues to overcome

In the acute phase, different factors regarding the trauma itself and thus which structures may be involved, have been studied both in experimental [3] and clinical settings [6]. There have also been attempts to identify patients at risk for persisting problems [7,8]. The WAD classification is today refuted by many, but there is still a lack of clinically suitable alternatives [9]. In the sub-acute or healing stage (3–6 months after trauma) the patient group is often scattered over several care-givers with an array of different interventions and thus often hard to follow-up. Therefore, performance of clinical studies is difficult both in the acute and sub-acute stages [10].

Studies using health surveys or databases can be misleading if the individuals define the disorder by themselves (“- I have a Whiplash. . .”), leading to over-diagnosing [11] or using e.g. the ICD-code S13.4 (neck distortion) from databases, leading to under-diagnosing, because physicians name cause and symptoms in different ways [12].

The Neck Pain and Whiplash Research Group at Queensland University, Australia (i.e. Jull et al.) have done a tremendous work in understanding neck pain after whiplash trauma [13]. However, all their own study groups are the result of advertising and may thus miss sub-groups, e.g. patients with cognitive deficits, identified in the paper by Styrke et al. [1]. They have an identified group of individuals, who all have been exposed to neck trauma, seeking care in a specific emergency department during one year. Of 325 identified individuals only 186 accepted participation. Are these 186 individuals representative for the initial cohort?

Another problem is to draw conclusions from questionnaires, although thoroughly developed, analyzed and customized for their purposes, they still only reflect a part of the total symptomatology. E.g. one would wish to understand the connection between cognitive dysfunction and affected life satisfaction with the actual pain and also with the level of disability. The use of a VAS scale, without information about frequency, activity, coping strategies and pain generating structures, provides limited contribution to the understanding of the well-being of the individual. The Neck Disability Index (NDI) is a validated and useful tool to describe the grade of disability [14,15]. The lack of this information is a limitation of the present study [1].

The cognitive functions are important to consider both in completions of questionnaires, in the rehabilitation – as well as in the insurance processes. The cause of cognitive dysfunction is, however, often hard to determine, since both brain injury, pain in itself, but also distress during socioeconomic and insurance processes can both trigger and be maintaining factors.

#### 6. How to proceed?

It is obvious that individuals who suffer from sequelae after neck trauma form a heterogeneous group and it is probably not very

fruitful to talk about “patients with whiplash injury” other than in very general terms.

In the preparation for The fifth International Whiplash Trauma Congress (IWTC:5) [16] an orthopaedic surgeon made the remark that “We used to talk about knee-injuries, but today we make distinctions about how the knee is injured and diagnose injuries of the meniscus, the anterior or posterior cruciate ligaments and so on. . .”. To transfer this statement into the neck is challenging, but could be useful in the ambition to treat patients with sequelae after trauma accurately.

A possibility could be to subgroup the patients according to symptomatology, but that would probably lead to a considerable number of subgroups, and in the end not useful neither for the patients nor for the health care system. Another alternative would be to apply Clinical Reasoning [17], since there are so many factors involved that contribute to the individual's well-being, recovery, or persisting dysfunction.

#### 7. A suggested assessment algorithm

We suggest an assessment algorithm (Fig. 1), useful in multidisciplinary team assessment (in our constellation physician, physiotherapist, psychologist and, when needed, social worker and occupational therapist):

*Pain generators*, including structural changes, in muscles (deep stabilizing, movement initializing and global movers), joints and ligaments, nerves and/or dysfunction in sensorimotor control and performance, as well as physical fatigue.

*Central nervous system's (CNS) reactions* to persisting pain including pain sensitization, sleep disorders, mental fatigue, cognitive and sensory mismatch (e.g. balance dysfunction).

*Psychological distress*, referring to depression, anxiety, and PTSD, but also to natural responses of strenuous situations and conditions. Here, personality disorders can have an impact.

*Social factors*, including societies demand on the individual as well as the individual's demands on society but also the individual's own demand on activity and participation level.

*The inner circle can be used as a summary of the actual situation*, reflecting the multiple dimensions of experience of the present (pain) situation as well as the consequences on function, activity and participation for the individual.

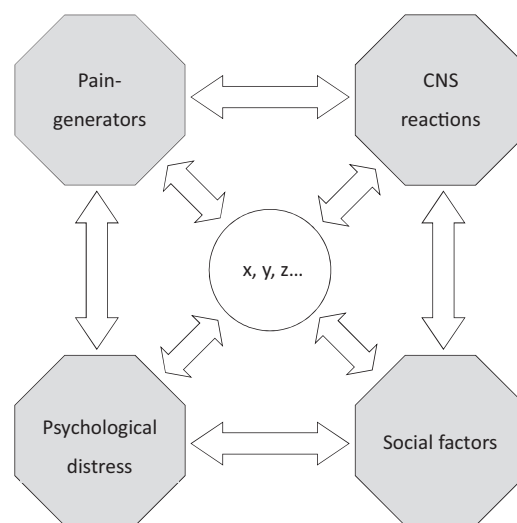


Fig. 1. Approach used for team assessment and communication with the patients at the “Specialized Pain Rehabilitation unit” in Lund, Sweden. See text.

All these factors should be considered in the assessment of a patient with sequelae after neck trauma and can be used as a template for a tailor-made rehabilitation programme.

## 8. Summary

*In summary*, in order to individualize interventions, in both clinical and in scientific settings in a structured way we need:

- to recognize the width of the possible symptoms that can occur after a whiplash trauma.
- a terminology that better describes the individual patient's actual condition.
- an algorithm for patient treatment after neck trauma, in order to improve the care, minimize the consequences and make it possible for everybody to reach their optimal recovery level.
- to be able to recognize the “complex patients” in early stages in order to individualize for specific needs.
- to be able to provide the legal and insurance systems with better data in order to give the right compensation to the right patients.

*The challenge of these potential enhancements will be further discussed at the next International Whiplash Trauma Congress (IWTC:6) in Lund, Sweden, August 2015.*

## Conflict of interest

No conflict of interest.

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