

**Clinical Practice Guidelines for the Physiotherapy Treatment of  
Patients with Whiplash Associated Disorders**

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## **Executive Summary and Key Points**

### ***Purpose of the Clinical Guideline for Physiotherapy Treatment of Patients with Whiplash Associated Disorders(WAD)***

- The purpose of this document is to review, expand, and modify a Dutch clinical practice guideline for the physiotherapy treatment of whiplash patients developed in the Netherlands in 2002.
- This document reports on the results of a current literature review, the process used to review and develop clinical guidelines and then makes evidence based recommendations based on the former and latter. It is meant to be used by Canadian physiotherapists as a guideline for the physiotherapy treatment of patients with whiplash associated disorders.
- This guideline has primarily been developed for physiotherapists; however, part of it may be used by physicians as well.

### ***Definition of Whiplash Associated Disorder and Scope of the Document***

- This guideline uses the most current and accepted definition of whiplash taken from the Monograph of the Quebec Task Force on Whiplash Associated Disorders(WAD): “Whiplash is an acceleration-deceleration mechanism of energy transfer to the neck. It may result from rear end or side impact motor vehicle collisions, but can also occur during diving or other mishaps. The impact may result in bony or soft tissue injuries (whiplash injury), which in turn may lead to a variety of clinical manifestations called WAD.”
- WAD have been classified into five grades of severity by the Quebec Task Force. This guideline has recommendations for levels I to III, with level IV mentioned briefly.

### ***Natural Course and Prognosis of WAD***

- There is conflicting information in the literature regarding the natural course of WAD after trauma. The estimated proportion of patients who report pain and disability after the accident varies between 19% and 60%. The estimated proportion of patients who are still absent from work after six months varies between 9% and 26%. Chronic whiplash is usually defined as symptoms or disabilities persisting for more than six months.
- Whiplash patients should progress their levels of activity, functions and participation at a similar recovery rate to other soft tissue injuries. Patients with delayed recovery experience no improvement or very small improvements in physical or mental functions, activities, and participation, or pain does not decrease.

### ***Process of Document Development***

- The guideline was developed according to the method for physiotherapy guidelines issued by the Canadian Physiotherapy Association and the Scottish Intercollegiate Guideline Network (SIGN).
- The author undertook a rigorous computer aided literature review from 2001 to present. The Dutch document provided a literature review for years prior to 2001.
- A Best Practices Task Force consisting of eight physiotherapists, including the author as well as the CEO of the Physiotherapy Association of British Columbia was formed. This task force used a consensus-based decision-making model to determine recommendations where scientific evidence was scant.
- The document was reviewed by a group of multi-disciplinary health professionals as well as eight other physiotherapists. Their comments were used to further edit the document where necessary.

### ***Recommendations***

- History taking should be systematic and well-documented. Outcome measures should be used.
- Physical examination should include the following: general observation, active examination, stability testing, muscular strength tests and neurological tests.
- The information from the subjective and objective examinations allows the physiotherapist to make a clinical diagnosis. The patient should be classified using the Quebec Task Force classification for WAD and an appropriate treatment plan determined.
- The primary goal of physiotherapy treatment is an early return to normal daily activities and the prevention of chronicity. Therefore, active interventions and manual (hands-on) therapy are recommended.

### ***Discussion***

- This clinical practice guideline for the physiotherapy treatment of patients with WAD provides a reference that assists physiotherapists to make proper diagnostic conclusions and treatment decisions in regards to whiplash patients. The main benefits of clinical practice guidelines are to improve the quality of care, to provide some uniformity in care, and to make physiotherapy more transparent to physicians, insurance adjusters, and patients.
- The clinical practice guidelines are not meant to be followed rigidly, but in most cases do provide valid recommendations that physiotherapists should follow. In some cases the physiotherapist may choose to deviate from the clinical guideline, when clinically it is not working or there is good reason to do so.
- The major systematic reviews and Dutch clinical practice guideline support the task forces' recommendations of early activation, education, manual therapy, and therapeutic exercise.

***Conclusion***

- This guideline provides a well researched, methodologically sound reference tool for physiotherapists and other health professionals to use as a clinical guideline for the physiotherapy treatment of patients with WAD.
- It is essential that more and better quality research is done in order to further develop and improve on best practice evidence-based guidelines.

**Introduction**

The incidence of reported cases of whiplash has risen dramatically in many Western countries over the last two decades. Overall, the rate of whiplash as a percentage of all other injuries in motor vehicle accidents (MVA) hovers at 35% world wide, but in British Columbia, Canada it is approximately 60%.<sup>(42)</sup> Although whiplash associated disorders (WAD) are not associated with a high rate of mortality they can cause a significant amount of morbidity. Direct economic costs such as legal, medical, rehabilitation, and pharmaceutical expenses, as well as, indirect costs such as time off work lead to a significant amount of money being spent on WAD. Recent trends have recognized physiotherapy as an effective treatment for WAD.<sup>(23)</sup> In British Columbia, Canada, physiotherapy has the highest utilization for treatment of patients with WAD; therefore, it is important that a methodologically sound Canadian clinical practice guideline for the physiotherapy management of whiplash patients is produced.

The purpose of this document is to review, expand, and modify a Dutch clinical practice guideline for the physiotherapy treatment of whiplash patients developed in the Netherlands in 2002.<sup>(55)</sup> This document reports on the results of a current literature review, the process used to review and develop clinical guidelines, and then makes evidence-based recommendations based on the former and latter. It is meant to be used by Canadian physiotherapists as a guideline for the physiotherapy treatment of patients with whiplash associated disorders.

## Definition of Whiplash and Scope of the Guideline

This guideline uses the most current and accepted definition of whiplash taken from the Monograph of the Quebec Task Force on Whiplash Associated Disorders (WAD):

“Whiplash is an acceleration-deceleration mechanism of energy transfer to the neck. It may result from rear end or side impact motor vehicle collisions, but can also occur during diving or other mishaps. The impact may result in bony or soft tissue injuries (whiplash injury), which in turn may lead to a variety of clinical manifestations called whiplash associated disorders.”(60) Neck pain, headache, and decreased mobility of the neck are the most common symptoms.(61) These WAD have been classified into five grades of severity by the Quebec Task Force. (**Table 1**) This guideline has recommendations for levels I to III, with level IV mentioned briefly. In most WAD I and II patients there is little evidence of damage to the cervical muscles, ligaments, discs, vertebrae or nerves even when imaging techniques, such as MRI are used.(51) WAD III patients and definitely WAD IV patients will have radiological findings, in the case of the former, disc herniation may image and in the latter, fracture or dislocation of the vertebrae.

<b>Table 1. Clinical Classification of Whiplash-Associated Disorders</b>	
Grade	Clinical Presentation
0	No complaint about the neck No physical sign(s)
I	Neck complaint of stiffness, pain, or tenderness only. No physical sign(s)
II	Neck complaint AND Musculoskeletal sign(s)*
III	Neck complaint AND Neurological sign(s)**
IV	Neck complaint AND Fracture or dislocation
*Musculoskeletal signs include decreased range of motion and point tenderness.	
**Neurologic signs include decreased or absent deep tendon reflexes, weakness and sensory deficits.	
Symptoms and disorders that can manifest in all grades include deafness, dizziness, tinnitus, headache, memory loss, dysphagia, and temporomandibular joint pain.	
Grades I, II, and III indicate the scope of the guideline.	

**Biopsychosocial Model**

One principle theory inlaid in this guideline is that whiplash trauma involves minor soft tissue damage that may lead to impairments in physical and mental functioning, disabilities, and participation problems in work or social activities.(55) The biopsychosocial model explains the former by looking at the patient as a system integrating biologic, social, and psychologic dimensions. All three of the dimensions

influence the outcome of a whiplash injury. The model also takes into account prognostic factors that may influence recovery(9;11;12) and emphasizes the role of psychologic and social factors in the development and persistence of symptoms and disabilities.(55)

### **Natural Course and Prognosis**

There is conflicting information in the literature regarding the natural course of WAD after trauma.(10;12;22;60;61) The estimated proportion of patients who report pain and disability after the accident varies between 19% and 60%.(61) The estimated proportion of patients who are still absent from work after six months varies between 9% and 26%.(60) Chronic whiplash is usually defined as symptoms or disabilities persisting for more than six months.(55)

Because of the lack of evidence on the natural course of whiplash, the authors of the Dutch clinical guideline decided by consensus to distinguish between patients with normal recovery and those with delayed recovery.(55) Whiplash is essentially a soft tissue strain/sprain caused by a motor vehicle accident. It can be presumed that the injuries incurred are similar to neck or low back injuries incurred with other activities. Therefore, one can assume that the recovery from whiplash injury is time dependant and comparable with those of other injuries. In other words, whiplash patients should progress their levels of activity, functions, and participation at a similar recovery rate to other soft tissue injuries. This is supported by the Quebec Task Force conclusions as well.(11;55;60) Patients with delayed recovery experience no improvement or very small

improvements in physical or mental functions, activities, and participation, or pain does not decrease.

### **Prognostic Factors**

There have been two systematic reviews recently completed on prognostic factors influencing WAD.(6;56) The main findings indicate that patients with high levels of initial pain showed the strongest propensity to prolonged recovery from whiplash. Other physical factors such as limited range of motion of the neck, psychological issues, and neuropsychological issues demonstrated modest influence on recovery.(56) There was conflicting evidence on whether gender, age, litigation, or economic status influence recovery.(6;56) It should be recognized that any of these factors may hinder recovery from whiplash, but they are outside the influence of the physiotherapist or physician; therefore, caution should be used when any of these factors, known as “Red flags” are present. (**Appendix 1**) Red flags are signs or symptoms which may indicate prolonged recovery from WAD injury and thus lead to delayed recovery time, outside of the normal timeframe described in this guideline.

## Method of Guideline Development

### Development Process

This guideline was proposed by the Physiotherapy Association of British Columbia (PABC) for the purpose of providing a general resource for its' members and for third party payers (insurance companies).

A task force was initiated in September of 2003 by the chief executive officer of PABC and a member of the PABC was asked to chair the "Best Practices Task Force." The member selected as chair is the author of this guideline and is a practicing orthopaedic physiotherapist in the province of British Columbia (BC), as well as a student in the Masters of Health Administration Program at the University of British Columbia.

The eight members of the task force, all practicing physiotherapists from across BC and the CEO of PABC, were invited to act as an expert opinion/consensus panel for making clinical decisions for the physiotherapy treatment of patients with whiplash associated disorders (WAD) where evidence was scant.

The guideline was developed according to the method for physiotherapy guidelines issued by the Canadian Physiotherapy Association and the Scottish Intercollegiate Guideline Network (SIGN).(58) SIGN has developed an electronic guideline handbook which details a rigorous methodology for guideline development and provides tools such as grading checklists for existing clinical guidelines, systematic reviews, random controlled trials, cohort studies, and case studies. (**Appendices 2-5**) Case studies were not accepted as evidence for this clinical guideline.

The author followed SIGN's protocol closely, but due to a limited time frame and to minimal human resources a single literature reviewer was used versus the two recommended. The guideline strengths and weaknesses will be discussed further at the end of the paper, but it is important to realize that this is a guideline, not a treatment protocol.

The Best Practice Task Force held its first meeting in early September, 2003 by teleconference. The purpose of this meeting was to discuss and develop a mandate for the task force and to determine the objective of the group. It was determined that the mandate of the group would be to answer the question **“What are evidence-based best practice recommendations for physiotherapy treatment of patients with whiplash associated disorder (WAD)?”** A secondary question was also addressed **“What third party-payer (insurer) communication model will work the best in conjunction with the treatment guideline?”**

The working group has met on a monthly basis either by telephone or in person. The group met in person in late November and formed the basis of the recommendations for the clinical guideline; by posing questions about treatment, and then where supporting evidence was not available or scarce, clinical judgment and expertise of the group was used to reach a consensus on the recommendation. The consensus model of decision making was used by the group to determine best practice where clinical evidence was scarce, otherwise evidence was graded as per Sackett et al.(23)

The questions posed to the Best Practice Task Force were formulated by the author and were general questions based on the subjective, objective, analysis and plan model of

physiotherapy treatment which is standard protocol for all Canadian physiotherapists.

Initial questions included the following:

1. What should a subjective assessment include?
2. What should an objective assessment include?
3. Does everyone agree with the phases of treatment and the recommendations outlined for each phase? Does anyone have anything to add?

The author presented all existing evidence-based literature for each question and where literature was scarce or non-existent the task force made a consensual recommendation based on their knowledge and clinical practice.

A clinical guideline was then drafted by the author and reviewed by the group. Once the task force was satisfied with the document it was circulated to a multiprofessional group consisting of four clinicians involved in providing care in this field (general practitioner, chiropractor, massage therapist, kinesiologist) and a patient with WAD. This group assessed the quality of the guideline and its applicability to everyday care. The content, formulation and style of the guideline as well as specificity and applicability to clinical practice were reviewed by eight practicing physiotherapists who were not involved in the guideline development. The former and latter groups' feedback was used to further improve the document. (**Appendix 6**)

A summary of the final guideline was presented in April 2004 at the Annual General Meeting of the Physiotherapist Association of BC to a membership audience of approximately 150 members who then offered general comments/criticisms on the recommendations.

The final guideline may be submitted to the Canadian Physiotherapy Association for approval.

An initial literature search was done to establish the need for a Canadian guideline for the physiotherapy treatment of patients with WAD. The latter search revealed an existing clinical guideline for WAD published in 2002 in the Netherlands.<sup>(55)</sup> Although this paper supplied an excellent source of guidance for Dutch physiotherapists, it was decided that the author and the task force would review and revise the existing document to specifically address Canadian physiotherapy treatment.

The main recommendations of the Canadian guideline for physiotherapy treatment of patients with WAD will be adapted from the Clinical Practice Guideline for the Physiotherapy of Patients with Whiplash Associated Disorders (WAD) by Scholten-Peeters et al.<sup>(55)</sup> This well received Dutch guideline will be reviewed, expanded on and revised to specifically address Canadian physiotherapy practice guidelines for WAD. As well, third party payer service guidelines will be added for each stage of the WAD therapeutic treatment process post-motor vehicle accident.

The primary difference between Dutch and Canadian physiotherapy practice lies in the defined scopes of practice. Canadian physiotherapists combine manual(hands-on) therapy, education, electrical modalities, and therapeutic exercise while the Dutch physiotherapists do not. In the Netherlands, manual therapy is a sub-speciality of physiotherapy and is practiced by manual therapists, not physiotherapists; therefore, the Dutch guideline does not address manual therapy as a physiotherapy treatment intervention for WAD. This guideline will include manual therapy as it is widely practiced by Canadian physiotherapists.

The methods of guideline development consist of four phases: (1) the preparation, (2) the design of the guideline, (3) the implementation, and (4) the revision phase. This paper will focus on stages 1 and 2, but stage 3 will be addressed in the future if implementation of the guideline takes place across BC through a joint PABC/Insurance Corporation of British Columbia (ICBC) initiative. This clinical guideline will be reviewed in three years and revisions made if new evidence is found which affects the physiotherapy treatment recommendations.

The guideline will be constructed according to the standard steps of physiotherapy assessment: referral, history taking, objective physical examination, analysis, formulation of treatment plan, treatment, and re-assessment.

The whiplash guideline preparation, literature review, and revisions were written as a Master's project by the author. A comprehensive literature review was done by the author and the best evidence was taken from systematic reviews, randomized clinical/controlled trials (RCTs), and prospective studies. As well, the author chaired a task force comprised of eight expert physiotherapists who made recommendations based on clinical knowledge where evidence was not available. The evidence was defined by grades according to Sackett et al.(25) and documented in an evidence table. (**Appendix 7**) Excluded studies were listed following the evidence table. (**Appendix 8**)

## **Literature Search for identification of new studies**

### **Search strategy for identification of studies**

A comprehensive computer aided search of Medline (2000 through December 2003), Cinahl (2000 through December 2003), Cochrane Controlled Trial Register (Volume 3, 2003), Cochrane Database of Systematic Reviews (Volume 3, 2003), Embase(2000 through December 2003), and the database of the Canadian Physiotherapy Association was undertaken. As well, Ms. Anita Gross of the Cochrane Cervical Group was contacted at McMaster University and she provided two unpublished systematic reviews via electronic mail.(22;70) References of relevant studies were also screened.

The databases were searched from 2000 through to December 2003 as a comprehensive systematic review had already been done up to mid 2001 by the authors of the existing clinical guideline for WAD.(55) It therefore made sense to use the former as a baseline document and to investigate studies done after it.

All databases were searched using the search strategy recommended by the book Systematic Reviews to Support Evidence-based Medicine.(33), which is a standard text describing how to read, analyse and perform systematic literature reviews.

In Medline (OVID WEB) the following subject specific search strategy (Table 2) was combined with all four levels of the article/review search strategy and modified for use in the other databases:

<b>Table 2: Search Strategy</b>
1) <u>Search strategy for the patient population:</u> <u>(whiplash OR neck pain OR neck sprain OR whiplash associated disorder)</u>
2) <u>Search strategy for the intervention:</u> <u>(physical therapy OR physiotherapy OR manual therapy OR exercise</u> <u>OR electrotherapy OR education )</u>
3) <u>Search strategy for diagnosis:</u> <u>(assessment OR measurement OR outcome measures OR range of motion)</u>
4) <u>Search strategy for guideline development:</u> <u>(evidence-based medicine OR clinical guideline OR grading</u> <u>recommendations</u>
5) <u>Combine 1 and 2.</u>
6) <u>Combine 1 and 3.</u>
7) <u>Combine 1 and 4.</u>
8) <u>Combine 2 and 3.</u>
9) <u>Combine 2 and 4.</u>
10) <u>Combine 1 and 2 and 3.</u>

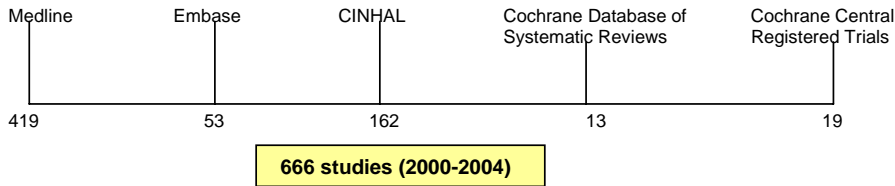
Articles were considered relevant and selected if (1) the study population included mechanical neck pain and/or whiplash patients, (2) outcome measures were related to functions, activities or participation, (3) outcome measures were within the scope of

current physiotherapy practice, (4) the treatment consisted of physiotherapy interventions, and (5) the language of publication was English.

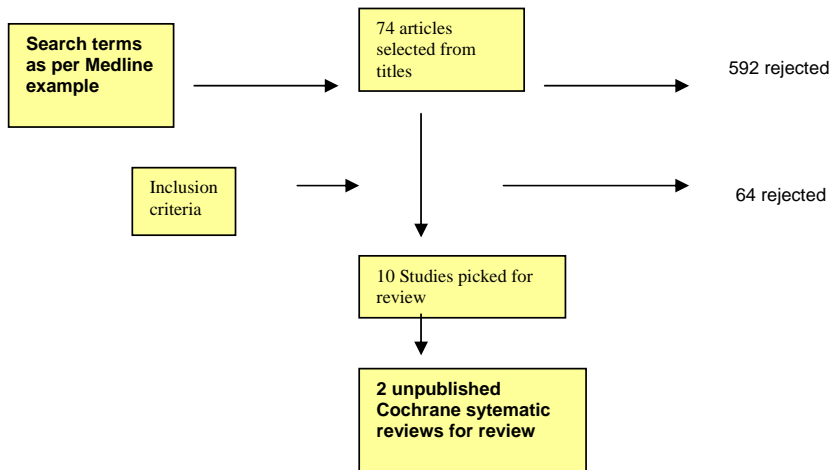
Articles were excluded if they did not meet the above inclusion criteria or were of poor methodological quality. Case studies were not included. **Figure 1** provides an overview of the literature search and the selection process.

**Figure 1: Flowchart describing literature search and selection process**

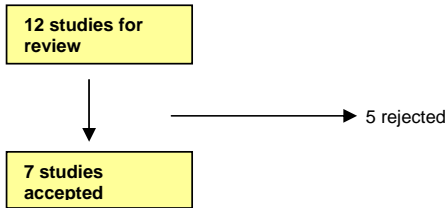
**1. Literature Search**



**2. Screening**



**3. Review**



## Selection of Studies

In all, 7 new entries were found to support the Best Practice Task Force’s recommendations for physiotherapy treatment of patients with WAD. Twelve articles were reviewed, but five were rejected, using Sackett et al.s’ (25) grading scale. (**Table 3**)

<b>Table 3: Levels of Evidence and Grades of Recommendations</b>		
Grades of Recommendation	Level of Evidence	Basis of Evidence
A	I++	Evidence obtained from a systematic review of RCT’s.*
A	I+	Evidence obtained from at least one RCT.
B	II++	Evidence obtained from at least one well-designed controlled study without randomisation.
B	II+	Evidence obtained from at least one well – designed quasi-experimental study.
C	III++	Evidence obtained from well – designed non –
	III+	experimental descriptive studies, such as comparative
	III-	studies, correlation studies and case studies.
D	IV	Evidence obtained from expert committee reports or opinions and/or clinical experience of respected authorities.
* RCT = Random Controlled Trial		

## **Treatment Strategies for Patients with Acute Whiplash Associated Disorders**

There is far more literature to support the acute treatment of whiplash than that of the chronic. The seven studies chosen to support the acute treatment of whiplash consist of three systematic reviews(22;47;70), one RCT(53), one cohort study(7), and two clinical practice guidelines(24;55) which are summarized below, as well as in the attached evidence table. (**Appendix 7**) The overall consensus among all of the former and latter articles is that early mobilization is a key treatment strategy that must be implemented.

### **Overview of the Selected Studies**

Two unpublished Cochrane systematic reviews, one from the Netherlands and the other from Canada were found. An American systematic review was also selected. The unpublished Dutch review by Verhagen et al.(70), titled “Conservative treatments for whiplash” assessed in a systematic review the efficacy of conservative treatment in whiplash patients. The original review(71) done in 2000 assessed eleven studies and concluded that “Rest makes rusty.” Four new RCTs met the inclusion criteria of the most recent review to reach a total of fifteen trials(3;4;13-16;27;38;39;46;49;52;54;59;63) included in the review. The data was re-analysed from the original study using a meta-analysis, and found to no longer totally support the aforementioned conclusion. The initial review did not use meta-analysis and was based on a comparison of the various author’s conclusions. The meta-analysis provides evidence to suggest that passive

treatment may work as effectively as active treatment; however, the trend is still that exercise and mobilisation are the most effective form of treatment for patients with WAD. This review followed the Cochrane systematic review protocol.

The unpublished Canadian, revised Cochrane review by Gross et al.(22), titled “Manipulation and Mobilisation for Mechanical Neck Disorders” (both manipulation and mobilisation are physiotherapy treatment techniques within the Canadian physiotherapy scope of practice for mechanical neck disorders), reviews thirty-three studies, six of which addressed whiplash associated disorders(8;17;29;38;39;49). Of the 33 trials, 42% were considered high quality trials. Gross et al. found strong evidence of benefit of multimodal care over a waiting list control for pain reduction, improvement in function and global perceived effect for subacute or chronic mechanical neck disorder (includes WAD). The common elements in this treatment strategy were mobilisation and/or manipulation plus exercise. There was no benefit found for single sessions of manipulation/mobilisation and there was minimal evidence to draw conclusions for the treatment of mechanical neck pain with radicular signs (WAD III).

A third American systematic review by Pietroban et al.(47), titled “Standard scales for measurement of functional outcome for cervical pain or dysfunction” which assessed evaluations of neck pain and/or dysfunction was selected. Outcome measures were assessed for validity, reliability, and responsiveness to change. This paper’s main weakness was a poor description of the methodology; however, it’s conclusions were valid based on the evidence described. The main conclusion is that the neck disability index is one of the best outcome measurement tools for neck pain/dysfunction.

Two clinical practice guidelines, one from the Netherlands(55) titled, “Clinical Practice Guideline for the Physiotherapy of Patients with Whiplash Associated Disorders” and the other a Canadian(24) guideline, titled, “Clinical Practice Guideline on the Use of Manipulation or Mobilisation in the Treatment of Adults with Mechanical Neck Disorders” were reviewed and selected.

The Dutch guideline includes a well-documented systematic review of the literature up to 2001, as well as an excellent description of the methodology used to formulate the treatment recommendations. It adequately satisfies all the requirements of an international guideline. (**Appendix 2**) Evidence and recommendations are graded to provide a clinical practice guideline for WAD based on Dutch physiotherapy practice.

The Canadian guideline includes an extremely thorough Cochrane review of the physiotherapy interventions of manipulation, mobilisation and multi-modal care. Pain, disability, and patient satisfaction were outcome measures used in this guideline and risk of adverse effect was also measured. The main conclusion of this systematic review was that neither manipulation or mobilisation done alone or in combination is effective. Multi-modal care involving the former and the latter, as well as therapeutic exercise produces significant decreases in patient pain and dysfunction and a significant increase in perceived global improvement. No adverse effects could be established.

One Swedish random controlled trial by Rosenfeld et al(53), titled, “Active Interventions in Patients with Whiplash Associated Disorders Improves Long-Term Prognosis” was reviewed and selected. The objective of this RCT was to compare the long-term efficacy of active intervention with that of standard intervention and the effect of early versus delayed initiation of intervention. Patients were randomized to an intervention using

frequent active cervical rotation and McKenzies' principles or to a standard intervention of initial rest, recommended soft collar, and gradual self-mobilisation. This methodologically sound RCT was designed as a three year follow-up of a prospective randomized trial of 97 adult patients exposed to whiplash trauma in motor vehicle accidents. Pain, neck range of motion and days of sick leave were analysed at 6 months and 3 years. The study concluded that active intervention is significantly more effective in reducing pain intensity and sick leave, and in retaining/regaining total range of motion than a standard intervention.

One Australian cohort study by Dall'Alba et al.(7), titled "Cervical Range of Motion Discriminates Between Asymptomatic Persons and Those With Whiplash" was reviewed and selected. This comparative study of cervical range of motion in asymptomatic persons and those with whiplash assessed cervical range of motion using a computerized, three dimensional tracking device. The study participants were 89 adult asymptomatic volunteers and 114 adult patients with persistent WAD. The measurements were analysed and the significant findings were that range of motion was reduced in all primary whiplash movements in patients with persistent WAD. On the basis of conjunct range of motion, age, and gender, 90.3% of study participants could be correctly categorized as asymptomatic or as having whiplash (sensitivity 86.2%, specificity 95.3%). The conclusion was that range of motion was capable of discriminating between asymptomatic persons and those with persistent WAD. This cohort study was well-described and followed methodologically sound protocol.

Two other Canadian systematic reviews of WAD literature are summarized in the following paragraphs as they are consistently used to provide evidence for the

physiotherapy treatment recommendations made in this guideline as well as in the Dutch guideline by Scholten-Peeters et al.(55)

The Quebec Task Force Scientific Monograph(60), considered the “Gold Standard” of whiplash research was published in 1995. The Quebec Task Force reviewed over 290 articles on whiplash and found little evidence to support treatment interventions for whiplash. The Quebec Task Force published a comprehensive report which defined whiplash and suggested treatment guidelines based on evidence and expert opinion. The end conclusion is similar to the other systematic reviews – early mobilisation is of utmost importance. There was weak evidence to support the use of mobilisations and manipulations with whiplash as well as the use of modalities; however, more recent reviews have concluded otherwise.(23;70)

Magee et al.(35) published a systematic review of the effectiveness of physical therapy interventions on soft tissue neck injuries. They considered all articles to be of weak methodological quality(15;16;38;39;44;49;50;62); however, a modest trend was identified for the positive effects of exercises, manual therapy, and postural education advice in whiplash patients. There was no evidence to support the use of a soft collar and rest.

To summarize, the above four systematic reviews provide some conflicting evidence; however, it does appear that exercise, manual therapy, and education are the optimal treatment for whiplash grades I to III. Based on the latter findings and clinical experience this guideline promotes early active management that encourages patients to return to normal activity as soon as possible.

## **Excluded Studies**

Five studies were selected for review; two systematic reviews, one cohort study, and two RCT's, and were excluded for the following reasons:

The Canadian systematic review by Cote et al.(6), titled "A Systematic Review of the Prognosis of Acute Whiplash" was methodologically sound; however, the objective of the study was to identify prognostic factors which may predict delayed recovery. This study was excluded because it did not make a meaningful conclusion that directly provides evidence to support the treatment recommendations made in this guideline.

Similarly, the Swedish cohort study by Kyhlback et al.(34), titled "Prognostic factors in whiplash associated disorders" was a linear study at three weeks, three months and one year after injury, which assessed and analysed how self-efficacy predicts delayed recovery from WAD. This study was not included because it's conclusion that self-efficacy at early stages of WAD significantly predicts the temporal development of pain was not based on methodologically sound evidence. All of the study subjects were informed of the purpose of the study and randomization was not done; therefore, significant bias may have occurred.

A British review by McClune et al.(36), titled "Whiplash associated disorders: a review of the literature to guide patient information and advice" was excluded mainly because it was not methodologically sound. The review did not use the Cochrane review format, the methodology was poorly described and no meta-analysis was performed; however, it does provide a condensed table which lists the existing WAD literature found and

identifies trends in WAD treatment interventions consistent with those found in the systematic Cochrane reviews.

The Danish random control trial by Kasch et al.(32), titled “Development in pain and neurologic complaints after whiplash” was reviewed and rejected due to poor methodological design. This study attempted to compare pain and neurologic complaints in patients with acute whiplash injury and in controls with acute ankle injury which is a completely invalid comparison group. As well the study was not blinded or randomised. The Austrian RCT by Thuile and Walzl(63) titled, “Evaluation of electromagnetic fields in the treatment of pain in patients with lumbar radiculopathy or the whiplash syndrome” is an excellent, methodologically sound study which evaluated the use of electromagnetic fields for pain reduction in WAD patients and patients with lumbar radiculopathy. It was excluded simply because it was reviewed and included in the Verhagen et al.(70) Cochrane systematic review which was already a selected study for this guideline.

### **Treatment Strategies for Patients with Chronic Whiplash Associated Disorders**

There is little methodologically strong evidence to support the efficacy of physiotherapy intervention for the treatment of chronic whiplash, with the exception of one recently published randomized clinical trial(5) by Bronfort et al. Bronfort et al. compared the effectiveness of spinal manipulation alone versus exercise alone versus manipulation and exercise (both low technological and high) and made the conclusion that for chronic neck pain, the use of strengthening exercises, whether in combination with spinal manipulation

or in the form of a high technology MedX program, appears to be more useful to patients with chronic neck pain than spinal manipulation alone.

Scholten-Peeters et al.(55) found one case series that weakly supported multimodal care for chronic patients.(69) They concluded and our task force agrees, that it is important to realize that physiotherapists treat many chronic neck and low back conditions and that parallels can be drawn from these treatment strategies to that for chronic whiplash. The systematic reviews identified by Scholten-Peeters et al.(20;21;28;30;31;41;48;64-68) indicate that exercise therapy, multidisciplinary treatments, and behavioral therapies are favorable in the management of chronic pain, particularly regarding return to normal activities and work. This evidence indicates that chronic whiplash should be treated with advice, education, and exercise therapy using behavioral principles.(55)

This guideline will make more detailed recommendations for acute whiplash associated disorder.

## Recommendations for the Diagnostic and Therapeutic Treatment of Patients with WAD Grade I to III

### The diagnostic process:

#### I. History Taking

To gather information into a health problem a systematic history is taken concerning the following: impairments such as pain level, concentration, mobility of the neck, dizziness or vomiting, tinnitus; functional disabilities such as difficulty sitting, driving, getting in or out of bed; activity involvement such as decreased level of exercise, decreased work, or interference with social relationships. During this stage the physiotherapist may be alerted to certain prognostic symptoms such as intolerable pain, pain all over, or excessive emergency admittance that may indicate the patient is a candidate for prolonged recovery.(55;60)

Key points of the history taking are presented in **Table 4**.

**Table 4: Key Points for History Taking of Whiplash Patients**

Date and events leading to the injury Present symptoms experienced by the patient Past history of the patient, recovery time if past injury Medical history Medications and other treatment interventions Diagnostic Tests (x-ray) Current employment history Coping strategy
--

Outcome measure questionnaires such as the Visual Analogue Scale (VAS)(40) and the Neck Disability Index(47;72) should be used to set a functional outcome and perceived pain baseline. (Grade B evidence) Coping strategy/attitude to the injury can be assessed with the Roland Morris Questionnaire or a similar outcome measure. (Grade B Evidence level) Patients who use passive coping strategies may be at higher risk for chronicity and the development of persistent symptoms than patients who use active coping strategies.(55) There are other outcome measures which are also effective; however, the Best Practice Task Force recommends the use of at least two of the above as they establish a method of gauging patient improvement and are methodologically sound.

## II. Physical Examination

There is limited literature on the valid diagnostic tests used for whiplash. There is Grade B evidence to support limited range of motion as a diagnostic test,(7) otherwise the tests are grade C or D. It is important that the physiotherapist is aware of prognostic factors associated with delayed recovery and of behavioral signs that may have therapeutic consequences.(11) In consensus, it was decided that the physical examination should include the following:

General observation/postural observation or cervical list (Grade C evidence)(12)and for overt pain behavior such as verbal exclamations, grimacing or rubbing. (Grade C evidence)(11)

An active examination of the cervical, thoracic, and lumbar spine, measuring range of motion(7)(Grade B evidence), quality of movement/endfeel and provocation of symptoms such as dizziness or radicular pain. (Grade D evidence)

A test for musculo-ligamentous stability is recommended by the task force. (Grade D evidence)

As well, other functions such as muscle strength, tenderness and sensations should be examined. If radicular pain is present, neurological tests such as the upper limb tension test, slump test and quadrant test should be performed. Manual traction should also be tested for the latter. (Grade D evidence)

### III. Analysis

The information from the subjective and objective examinations allows the physiotherapist to make a clinical diagnosis.(26) The patient should be classified using the Quebec Task Force classification for WAD.(60) The physiotherapist then decides whether there is an indication for treatment and decides on a treatment plan.

If WAD III or severe WAD II is clinically diagnosed and radiological tests have not been done, the physiotherapist should request x-rays through the family physician.(60)

Treatment may proceed with caution; however, if there is any indication of WAD IV the physiotherapist must take immediate action, refer the patient to emergency for x-ray or call the family physician and explain the situation. Physiotherapy treatment is not indicated for acute WAD IV/fracture.(60)(Evidence level A and D)

### IV. Treatment Plan

The primary goal of physiotherapy treatment is an early return to normal daily activities and the prevention of chronicity.(22;55;60); therefore, active interventions and manual (hands-on) therapy are recommended. (Grade A evidence)(22;35;55;60;70) It should be

noted that there is a difference between patients with normal recovery and those with delayed recovery. In whiplash patients with normal recovery, goals are set at the level of activity and/or related impairments in function (e.g. lifting and strength). In whiplash patients with delayed recovery the main goals may be to influence factors that are responsible for poor progress and to improve coping strategies.(55) It should be recognized that many of these factors are outside the physiotherapists expertise and need to be addressed by other health professionals (e.g. psychologist).

### **The Therapeutic Process**

#### Recommendations for Treatment Methods and Goals in Five Phases (adapted from Scholten-Peeters(55)guideline)

The time frame of the Quebec Task Force provides a guide for the clinical management of whiplash(60) combined with the classification of normal or delayed recovery.

#### Phase 1 (<4 days)

Soft tissue damage follows whiplash trauma for a period of approximately 2 days of inflammation followed by a period of 6 to 8 weeks of tissue healing/remodeling and regeneration.(37) The task force recommends that the patient in Phase I act as usual without creating excess pain.

The treatment goals in phase I are the following:

1. reduce pain.
2. provide information.
3. explain the consequences of whiplash.

To reach these goals, recommend education regarding whiplash lasting for limited time and range of motion exercises for the cervical/thoracic/lumbar spine within the comfortable range. (Grade A evidence)(35;52;60;70) Advice to rest or wear a soft collar is not recommended for WAD Grade II and I, but rest or collar may be prescribed for no greater than 4 days for WAD III. (Grade A evidence)(35;52;60;70) In consultation with the doctor, nonsteroidal anti-inflammatory drugs may be advised for patients with a high level of pain. (Grade A evidence)(60)

The physiotherapist will inform the patient about the nature of the injury, ask the patient what he or she expects about the prognosis, and explain the risk of development of chronic pain if the patient does not maintain mobility. It should be explained that activity is the best way to expedite recovery and that rest, soft collars and relying on medications may lead to prolonged recovery.(4;12;38;45;52;60)

#### Phase 2 (4 days to 3 weeks)

Treatment focuses on increasing function and returning the patient to normal activities as soon as possible for WAD patients graded I to III. To attain these goals it is important to

continue to educate and provide support to the patient, as well as reassurance about the benign nature of whiplash. Graded activation may help prevent fear of movement.

The following treatment goals are set: continue to provide information and reinforce activation; improve function (e.g. muscular strength, ROM, pain); and increase functional activity. Physiotherapy interventions such as education, exercise, muscle re-training in combination with manual therapy are advocated. (Grade A evidence)(22;60;70)

Electrical modalities may be used in conjunction with the above treatment interventions, although it is not recommended to use them as the primary treatment. (Grade D evidence)

The physiotherapist may further educate the patient on workplace ergonomics, postural positioning, the resumption of activity, and the importance of self-efficacy.(43) It should be stressed that with activation the patient may experience temporary pain; however, the benefits of therapeutic exercise facilitate normal tissue healing and prevent long-term impairment. The task force emphasizes that the patient should be taught and encouraged to increase their activities gradually and that rest is not the solution.

### Phase 3 (3 to 6 weeks)

During this phase activities are increased to a level of tolerance. The treatment becomes focused on improving activities rather than pain reduction. The physiotherapist must reassure the patient that the increased activity will lead to decreased pain. At this stage it is important to try to educate the patient on coping strategies while still conveying that whiplash is usually of limited duration.

For normal recovery, the treatment goals are as follows: continue to educate and provide reassurance; improve function; increase activities; and encourage increased participation in social activities. Active exercise programs, re-training of activities and continued education are recommended during this phase. (Evidence level A)(22;35;60;70) Manual therapy may be used to decrease patients pain and increase function during this increased activity phase. (Evidence Level A)(22) Electrical modalities may be used for muscle re-education, biofeedback or pain relief. (Evidence Level D)

For delayed recovery, the main treatment goals are as follows; improving coping strategies and self-efficacy, (e.g. stretching and using ice at home). Interventions such as education, exercise therapy based on behavioral principles, and training of functional patterns and activities evidence are recommended. (Grade A)(22;35;60;70) It is very important that the therapist have open communication with the physician, so that treatments are not in conflict, and the physician is aware of any delayed recovery issues. It is equally important that the physiotherapist continues to communicate and educate the patient with coping strategies and self-efficacy. The therapist can provide the patient with mental exercises that may help de-emphasize pain and allow the patient to increase activity. (Grade D evidence)

There is limited evidence that mechanical or manual traction may benefit WAD III patients during this phase.(60) Regardless of the grade of WAD, return to activity and self-efficacy should be promoted. (Grade A evidence).(60)

Phase 4 (6 weeks to 3 months)

Treatment is focused on increasing activities and participation. The main treatment goals are education and continued reassurance and improving the level of activities and participation.

In patients with delayed recovery, the treatment goals continue to be introducing and encouraging the patient to use coping strategies while activation occurs. These patients must be actively involved in the treatment process and be dissuaded from assuming a passive role and expecting to be cured by the physiotherapist. The recommended interventions are education, training of activities, and therapeutic exercise. (Grade D evidence)

Phase 5 (>3 months)

Patients with long lasting participation problems, disabilities or impairments have less likelihood of recovery than do patients whose symptoms resolve in the acute phase.(60;61) The task force recommends similar treatment goals as in Phase 4 with a continued education and activation approach to treatment intervention. (Grade D evidence) A multidisciplinary team approach may be considered for patients who are still at minimal levels of functional activity, (e.g. not returned to work). (Grade C evidence)(49)

Patients with Grade III WAD may experience pain for longer periods than other grades depending on the cause and severity of the radicular pain; however, most are able to return to reasonable function and activity level by this stage. (Grade D evidence)

### **Evaluation and Communication**

The task force would like to emphasize the importance of proper evaluation of the treatment goals and responses to treatment, at the beginning of treatment, during treatment, and at the end of treatment, using adequate, reliable, and valid measurement tools that reflect the same determinants of recovery as the treatment goals (e.g. outcome measures such as the VAS for pain, Neck Disability Index for function and Roland-Morris for coping strategies). The Best Practice Task Force has recommended a service-provider flow-chart detailing appropriate communication. (**Appendix 9**) Presently, in British Columbia, communication is varied and inconsistent among practitioners. It is important to have a cohesive working relationship with the physician and with the third party payer representative. This ensures that the patient is receiving appropriate non-conflicting treatment from the health care professionals and that payment is provided by the insurance company. It also ensures that the patient does not have to worry about not receiving adequate care.

## Discussion

This clinical practice guideline for the physiotherapy treatment of patients with whiplash associated disorders provides a reference that assists physiotherapists to make proper diagnostic conclusions and treatment decisions in regards to whiplash patients. The main benefits of clinical practice guidelines are to improve the quality of care, to provide some uniformity in care, and to make physiotherapy more transparent to physicians, insurance adjusters, and patients.(18;58) This clinical practice guideline is not meant to be followed rigidly, but in most cases does provide valid recommendations that physiotherapists should follow. In some cases the physiotherapist may choose to deviate from the clinical guideline, when clinically it is not working or there is good reason to do so.

It is important that the physiotherapist recognize the boundaries which define WAD in order to make an accurate diagnosis and treatment plan. This guideline is appropriate for use with patients with WAD I to III and may be adapted for patients who fall outside these categories. There are many exceptions (**Appendix 10**), such as impingement of the shoulder tendons, which occur in conjunction with WAD that may change the patients recovery time.

The contents of this guideline are based on scientific evidence where it was available. Although there is not a huge amount of good quality, methodologically sound evidence related to the diagnosis, treatment, and evaluation of whiplash, there were four high quality systematic reviews(23;35;60;70) that could be used to form the majority of the recommendations. Where evidence was lacking, consensus from the Best Practice Task

Force was used. This may result in some bias; however, the major systematic reviews and Dutch clinical practice guideline do support the task force's recommendations of early activation, education, manual therapy, and therapeutic exercises.(22;35;55;60;70)

The Best Practice Task Force was a voluntary task force of practicing physiotherapists. Its members were not nominated and may not be considered by everyone to be "experts"; however, all members do treat patients with WAD and are qualified physiotherapists.

A risk of consensus-based recommendations is that these recommendations may be wrong or inferior to other options(73); however, by the same token there is often conflicting scientific-based evidence in the literature. The author has graded the evidence for recommendations so that readers can tell where scientific evidence was used versus consensus-based recommendations. The reader may choose to follow the evidence-based recommendations more readily than the latter.(19)

Evidence-based recommendations are not necessarily better than those made by practicing clinicians. Research trials often do not replicate clinical situations as patients are selected or excluded based on specific criteria. Real-life clinical scenarios involve patients of all different types. It is important to realize that the guideline is not applicable to every patient who presents with WAD and that the physiotherapist must trust his or her own clinical judgment. This clinical guideline may assist physiotherapists in clinical decision making and in optimizing the quality of care.

This guideline has primarily been developed for physiotherapists; however, part of it may be used by physicians as well. Many patients can be adequately treated through physician information regarding the consequences of whiplash, importance of movement

and quick return to function. Currently a study is underway in the Netherlands which further explores the effect of physician versus physiotherapist intervention.(57)

This guideline may also help other health professionals understand the role and scope of physiotherapists in treating whiplash.

An important treatment goal of this guideline is the prevention of chronicity in WAD patients. Physiotherapists must be aware of prognostic factors, such as excessive restriction of range of motion and prolonged, exaggerated pain that may predispose patients to chronic pain post-WAD. More research needs to be done to reach a conclusion on which factors contribute the most to chronic whiplash and how to treat them.

The survey and annual general meeting feedback from selected health professionals and physiotherapists on the applicability, content, and quality of the guideline was overall positive in nature. The five question survey (**Appendix 6**) did not have anyone rate any of the questions posed below a 4 out of 5 score. Everyone surveyed found the document to be comprehensive, valid, and applicable to clinical practice; however, a number of people did comment that this guideline does not address the issue of chronic whiplash and its' treatment and as this is a common clinical problem, it must be addressed. The other comment most frequently made was that the Quebec Task Force is not considered a gold standard by everyone. This may be true, but it is the one most frequently used in international studies and by automobile insurance agencies.

Physiotherapists who use this guideline need to understand the natural course of whiplash, the influence of prognostic factors such as litigation, the available scientific evidence, and some principles of behavioral therapy.(55) They also need to have strong

interpersonal skills in order to meet the treatment goals of education, increased activity, decreased impairment, and increased participation for whiplash patient rehabilitation.

Although behavior modification is not a primary focus of physiotherapy, most physiotherapists practice it through education and active exercise programs. It may be beneficial for physiotherapists to learn more about behavior modification as this appears to be a large obstacle to many patients recovering from whiplash.

The Quebec Task Force (60) examined the educational curriculums of primary health care professionals, including physiotherapists and physicians, and found whiplash education to be minimal in Canadian universities. As far as the author can discern, this has not changed. This guideline may help to educate physiotherapists about whiplash. I strongly recommend that all physiotherapists read the major systematic reviews included in this guidelines' references, (22;35;60;70) in order to gain a greater understanding of the topic. Physiotherapists should also search out current literature that may add to or critique the aforementioned reviews.

This guideline will only be beneficial if it is implemented properly. It is a well-known fact that people are resistant to change; therefore, it is imperative that implementation strategies are well researched and used successfully, otherwise this guideline will be not be used.(2;18;58)

**Conclusion**

This clinical practice guideline for physiotherapy management of patients with whiplash associated disorders Grade I to III was developed to assist Canadian physiotherapists in the diagnosis and treatment of whiplash patients. The majority of the recommendations are similar to the Dutch guideline; however, there are some major differences (manual therapy) and our group attempted to include WAD grade III patients. Some of the recommendations in the document were made on a consensus-based, decision-making process amongst experts and the general principles were scientifically based. It is essential that more and better quality research be done in order to further develop and improve on best practice evidence-based guidelines. In particular, research questions must be posed about treatment for chronic whiplash.

It is recommended that a task force for implementation of this guideline be struck so that implementation will proceed effectively and efficiently. It is vital that the majority of physiotherapists use best practice guidelines for the treatment of patients with WAD as it increases their accountability and ensures a more uniform approach throughout the profession. Third party payers, such as ICBC, are demanding more and more of physiotherapists and requesting evidence-based practice; therefore, it is essential that the profession has this guideline as a resource. The purpose of the implementation task force will be to research and strategically plan a successful dissemination of the guideline to physiotherapists, physicians, and third party payers.

## Appendix 1

### **Red Flag List**

Evidence in the literature has indicated that there are certain predictors of chronicity that may influence Best Practice treatment timelines. For the purposes of this model we are calling these predictors "red flags". The presence of one or more factors may indicate the need for additional behavioural or medical intervention.

- Loss of consciousness
- Multiple areas of injury (>2)
- Neurological involvement
- Pre-existing / Co-Morbid condition
- Prior injury to the same area
- Significant structural damage
- High medication intake
- High perceived pain/disability level
- Treatment initiated beyond 6 weeks
- Psychological/Neuropsychological/Psychosocial issues
  - believes hurt equals harm
  - fears/avoids activity
  - low mood/social withdrawal
  - prefers passive treatments
- Poor coping strategies
- Home environment concerns
- Work environment concerns

## Appendix 2

**SIGN 50: A guideline developers' handbook**

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**Annex A****AGREE (Appraisal of Guidelines for Research & Evaluation in Europe)  
appraisal criteria**

<b>SCOPE AND PURPOSE</b>
1. The overall objective(s) of the guideline should be specifically described.
2. The clinical question(s) covered by the guideline should be specifically described.
3. The patients to whom the guideline is meant to apply should be specifically described.
<b>STAKEHOLDER INVOLVEMENT</b>
4. The guideline development group should include individuals from all the relevant professional groups.
5. The patients' views and preferences should be sought.
<b>RIGOUR OF DEVELOPMENT</b>
6. Systematic methods should be used to search for evidence.
7. The criteria for selecting the evidence should be clearly described.
8. The methods used for formulating the recommendations should be clearly described.
9. The health benefits, side effects and risks should be considered in formulating the recommendations.
10. There should be an explicit link between the recommendations and the supporting evidence.
11. The guideline should be externally reviewed by experts prior to publication.
12. A procedure for updating the guideline should be provided.

<b>CLARITY AND PRESENTATION</b>
13. The recommendations should be specific and unambiguous.
14. The different options for diagnosis and/or treatment of the condition should be clearly presented.
15. Key recommendations should be easily identifiable.
<b>APPLICABILITY</b>
16. The target users of the guideline should be clearly defined.
17. The potential organisational barriers in applying the recommendations should be discussed.
18. The potential cost implications of applying the recommendations should be considered.
19. The guideline should be supported with tools for application.
20. The guideline should presents key review criteria for monitoring and audit purposes
21. The guideline should be piloted among end users.
<b>EDITORIAL INDEPENDENCE</b>
22. The guideline should be editorially independent from the funding body.
23. Conflicts of interest of guideline development members should be recorded.

For further information, see the AGREE website:

<http://www.agreecollaboration.org>

[SIGN guide to the AGREE guideline appraisal instrument.](#)

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## Appendix 3



### SIGN 50: A guideline developers' handbook

#### Methodology Checklist 1: Systematic Reviews and Meta-analyses

Study identification ( <i>Include author, title, year of publication, journal title, pages</i> )		
Guideline topic:	Key Question No:	
Checklist completed by:		
<b>Section 1: Internal validity</b>		
	<b><i>In a well conducted systematic review</i></b>	<b><i>In this study this criterion is:</i></b>
1.1	The study addresses an appropriate and clearly focused question.	Well covered Adequately addressed Poorly addressed
		Not addressed Not reported Not applicable
1.2	A description of the methodology used is included.	Well covered Adequately addressed Poorly addressed
		Not addressed Not reported Not applicable
1.3	The literature search is sufficiently rigorous to identify all the relevant studies.	Well covered Adequately addressed Poorly addressed
		Not addressed Not reported Not applicable
1.4	Study quality is assessed and taken into account.	Well covered Adequately addressed Poorly addressed
		Not addressed Not reported Not applicable
1.5	There are enough similarities between the studies selected to make combining them reasonable.	Well covered Adequately addressed
		Not addressed Not reported Not applicable

		Poorly addressed	
<b>Section 2: Overall assessment of the study</b>			
2.1	How well was the study done to minimise bias?  <i>Code ++, +, or -</i>		
2.2	If coded as +, or - what is the likely direction in which bias might affect the study results?		
<b>Section 3: Description of the study - <i>Please print answers clearly</i></b>			
3.1	What types of study are included in the review?  <i>(Highlight all that apply)</i>	RCT / CCT / Cohort / Case-control / Other	
3.2	How does this review help to answer your key question?  <i>Summarise the main conclusions of the review and how it relates to the relevant key question. Comment on any particular strengths or weaknesses of the review as a source of evidence for a guideline produced for the NHS in Scotland.</i>		

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Appendix 4



**SIGN 50: A guideline developers' handbook**  
**Methodology Checklist 2: Randomised Controlled Trials**

Study identification ( <i>Include author, title, year of publication, journal title, pages</i> )			
Guideline topic:		Key Question No:	
Checklist completed by:			
<b>Section 1: Internal validity</b>			
<b><i>In a well conducted RCT study...</i></b>		<b><i>In this study this criterion is:</i></b>	
1.1	The study addresses an appropriate and clearly focused question.	Well covered	Not addressed
		Adequately addressed	Not reported
		Poorly addressed	Not applicable
1.2	The assignment of subjects to treatment groups is randomised	Well covered	Not addressed
		Adequately addressed	Not reported
		Poorly addressed	Not applicable
1.3	An adequate concealment method is used	Well covered	Not addressed
		Adequately addressed	Not reported
		Poorly addressed	Not applicable
1.4	Subjects and investigators are kept 'blind' about treatment allocation	Well covered	Not addressed
		Adequately addressed	Not reported
		Poorly addressed	Not applicable
1.5	The treatment and control groups are similar at the start of the trial	Well covered	Not addressed
		Adequately addressed	Not reported
		Poorly addressed	Not applicable

1.6	The only difference between groups is the treatment under investigation	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.7	All relevant outcomes are measured in a standard, valid and reliable way	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.8	What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?		
1.9	All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis)	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.10	Where the study is carried out at more than one site, results are comparable for all sites	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
<b>Section 2: Overall assessment of the study</b>			
2.1	How well was the study done to minimise bias?  <i>Code ++, +, or -</i>		
2.2	If coded as +, or - what is the likely direction in which bias might affect the study results?		
2.3	Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention?		

2.4	Are the results of this study directly applicable to the patient group targeted by this guideline?	
<b>Section 3: Description of the study (the following information is required to complete evidence tables facilitating cross-study comparisons. Please complete all sections for which information is available).</b> <b><i>Please print clearly</i></b>		
3.1	How many patients are included in this study?  <i>Please indicate number in each arm of the study, at the time the study began.</i>	
3.2	What are the main characteristics of the patient population?	
3.3	What intervention (treatment, procedure) is being investigated in this study?  <i>List all interventions covered by the study.</i>	
3.4	What comparisons are made in the study?  <i>Are comparisons made between treatments, or between treatment and placebo / no treatment?</i>	
3.5	How long are patients followed-up in the study?  <i>Length of time patients are followed from beginning participation in the study. Note specified end points used to decide end of follow-up (e.g. death, complete cure). Note if follow-up period is shorter than originally planned.</i>	
3.6	What outcome measure(s) are used in the study?  <i>List all outcomes that are used to</i>	

	<i>assess effectiveness of the interventions used.</i>	
3.7	<p>What size of effect is identified in the study?</p> <p><i>List all measures of effect in the units used in the study – e.g. absolute or relative risk, NNT, etc. Include p values and any confidence intervals that are provided.</i></p>	
3.8	<p>How was this study funded?</p> <p><i>List all sources of funding quoted in the article, whether Government, voluntary sector, or industry.</i></p>	
3.9	<p>Does this study help to answer your key question?</p> <p><i>Summarise the main conclusions of the study and indicate how it relates to the key question.</i></p>	

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Appendix 5



**SIGN 50: A guideline developers' handbook**  
**Methodology Checklist 3: Cohort Studies**

Study identification ( <i>Include author, title, year of publication, journal title, pages</i> )								
Guideline topic:		Key Question No:						
Checklist completed by:								
<b>Section 1: Internal validity</b>								
<b><i>In a well conducted cohort study:</i></b>		<b><i>In this study the criterion is:</i></b>						
1.1	The study addresses an appropriate and clearly focused question.	<table border="1"> <tr> <td>Well covered</td> <td>Not addressed</td> </tr> <tr> <td>Adequately addressed</td> <td>Not reported</td> </tr> <tr> <td>Poorly addressed</td> <td>Not applicable</td> </tr> </table>	Well covered	Not addressed	Adequately addressed	Not reported	Poorly addressed	Not applicable
Well covered	Not addressed							
Adequately addressed	Not reported							
Poorly addressed	Not applicable							
<b><i>Selection of subjects</i></b>								
1.2	The two groups being studied are selected from source populations that are comparable in all respects other than the factor under investigation.	<table border="1"> <tr> <td>Well covered</td> <td>Not addressed</td> </tr> <tr> <td>Adequately addressed</td> <td>Not reported</td> </tr> <tr> <td>Poorly addressed</td> <td>Not applicable</td> </tr> </table>	Well covered	Not addressed	Adequately addressed	Not reported	Poorly addressed	Not applicable
Well covered	Not addressed							
Adequately addressed	Not reported							
Poorly addressed	Not applicable							
1.3	The study indicates how many of the people asked to take part did so, in each of the groups being studied.	<table border="1"> <tr> <td>Well covered</td> <td>Not addressed</td> </tr> <tr> <td>Adequately addressed</td> <td>Not reported</td> </tr> <tr> <td>Poorly addressed</td> <td>Not applicable</td> </tr> </table>	Well covered	Not addressed	Adequately addressed	Not reported	Poorly addressed	Not applicable
Well covered	Not addressed							
Adequately addressed	Not reported							
Poorly addressed	Not applicable							
1.4	The likelihood that some eligible subjects might have the outcome at the time of enrolment is assessed and taken into account in the analysis.	<table border="1"> <tr> <td>Well covered</td> <td>Not addressed</td> </tr> <tr> <td>Adequately addressed</td> <td>Not reported</td> </tr> <tr> <td></td> <td>Not applicable</td> </tr> </table>	Well covered	Not addressed	Adequately addressed	Not reported		Not applicable
Well covered	Not addressed							
Adequately addressed	Not reported							
	Not applicable							

		Poorly addressed	
1.5	What percentage of individuals or clusters recruited into each arm of the study dropped out before the study was completed.		
1.6	Comparison is made between full participants and those lost to follow up, by exposure status.	Well covered  Adequately addressed  Poorly addressed	Not addressed  Not reported  Not applicable
<b>Assessment</b>			
1.7	The outcomes are clearly defined.	Well covered  Adequately addressed  Poorly addressed	Not addressed  Not reported  Not applicable
1.8	The assessment of outcome is made blind to exposure status.	Well covered  Adequately addressed  Poorly addressed	Not addressed  Not reported  Not applicable
1.9	Where blinding was not possible, there is some recognition that knowledge of exposure status could have influenced the assessment of outcome.	Well covered  Adequately addressed  Poorly addressed	Not addressed  Not reported  Not applicable
1.10	The measure of assessment of exposure is reliable.	Well covered  Adequately	Not addressed  Not reported

		addressed Poorly addressed	Not applicable
1.11	Evidence from other sources is used to demonstrate that the method of outcome assessment is valid and reliable.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.12	Exposure level or prognostic factor is assessed more than once.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
<b>Confounding</b>			
1.13	The main potential confounders are identified and taken into account in the design and analysis.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
<b>Statistical analysis</b>			
1.14	Have confidence intervals been provided?		
<b>Section 2: Overall assessment of the study</b>			
2.1	How well was the study done to minimise the risk of bias or confounding, and to establish a causal relationship between exposure and effect?  <i>Code ++, +, or -</i>		
2.2	Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the exposure		

	being investigated?	
2.3	Are the results of this study directly applicable to the patient group targeted in this guideline?	
<b>Section 3: Description of the study (Note: the following information is required for evidence tables to facilitate cross-study comparisons. Please complete all sections for which information is available). Please print clearly</b>		
3.1	How many patients are included in this study?  <i>List the number in each group separately</i>	
3.2	What are the main characteristics of the study population?	
3.3	What environmental or prognostic factor is being investigated in this study?	
3.4	What comparisons are made in the study?  <i>Are comparisons made between presence or absence of an environmental / prognostic factor, or different levels of the factor??</i>	
3.5	For how long are patients followed-up in the study?	
3.6	What outcome measure(s) are used in the study?  <i>List all outcomes that are used to assess the impact of the chosen environmental or prognostic factor.</i>	
3.7	What size of effect is identified in the study?  <i>List all measures of effect in the units used in the study – e.g. absolute or relative risk. Include p values and any confidence intervals that are provided. Note: Be sure to include any adjustments made for confounding factors, differences in prevalence, etc.</i>	
3.8	How was this study funded?  <i>List all sources of funding quoted in the article, whether Government, voluntary sector, or industry.</i>	
3.9	Does this study help to answer your key	

question?	
<i>Summarise the main conclusions of the study and indicate how it relates to the key question?</i>	

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**Appendix 6**

Therese Ann Leigh Physiotherapist Corp.  
221 West 24<sup>th</sup> Street  
North Vancouver, BC  
V7M 2C5

Dear Colleague;

I have attached a draft of the Clinical Practice Guidelines for the Physiotherapy Treatment of Patients with Whiplash Associated Disorder. Please read through the paper and then answer the following five-point questionnaire. Your feedback will be taken into account for the final document.

I will require the draft document to be returned as well as the questionnaire and have provided a mail-back envelope. If the document was sent by e-mail, please e-mail the questionnaire to [trezle@shaw.ca](mailto:trezle@shaw.ca).

Thank-you for taking the time to read this document and I look forward to reading any comments.

Sincerely,

Therese Leigh,  
B.Sc. (P.T.), FCAMT, MCPA

**Questionnaire:**

Please circle the applicable number on a scale of 1 to 5. 1 is extremely poor, 2 is poor, 3 is fair, 4 is above average and 5 is excellent.

- |  |           |
|--|-----------|
| 1. Is the purpose of the document well – stated and clearly defined? | 1 2 3 4 5 |
| 2. Does the document satisfy methodological requirements?            | 1 2 3 4 5 |
| 3. Are the recommendations easy to understand?                       | 1 2 3 4 5 |
| 4. Do you think the recommendations are valid?                       | 1 2 3 4 5 |
| 5. Overall, do you think this document is useful?                    | 1 2 3 4 5 |

Comments:

**Appendix 7: Evidence Table**

Author	Year	Study Type	Quality Rating	Population	Outcomes Measured	Effect Size	Confidence Intervals/ p-values	Confidence	Comments
<b>Dall'Alba et al.(7)</b>	2001	Cohort	2-	Control - No history of neck injury/pain. Study Group Persistent WAD (I-III), over 18yrs. Exclusion: WADIV, mult. Trauma, non-English speaking	Range of Motion Cervical Spine, VAS, Northwick Index	N=89 asymptomatic N=114 WAD	P=0.00 for group and age, but not gender.	90.3% correct categorization. Sensitivity=86.2% Specificity=95.3% ROM alone as Predictor=79.5% Correct.	ROM was reduced in WAD group. Movement in the sagittal plane was most restricted.
<b>Gross et al.(22)</b>	2004	Cochrane Systematic Review	1++	Adults greater than/equal to 18yrs. with MND, including WAD Grade I-III, acute, sub-acute, chronic Excludes: long tract, other pathologies, non-cervical headache, mixed headache	VAS, NDI, Pt. Satisfaction, global perceived effect	33 trials reviewed 6 WAD specific(8;17;29;38;39;49)	Non-significant p value for pain relief for single sessions of manip/mob or manip and mob.	Strong evidence of benefit for multimodal care over wait list control for pain relief [Pooled SMD -.57(95%CI: -.94 to-.21)], and global perceived effect[SMD -2.73(95%CI: -3.30 to -2.16)] for sub-acute/chronic MND with/without headache. Moderate evidence of no difference in effect when multimodal care(manip and/or mobs and exercise) was compared to other treatments.	Multimodal care has benefits for sub-acute and chronic WAD with/without headache. No evidence that manip is better than mob or vice-versa when done alone or with modalities. Insufficient evidence to draw conclusion for radicular findings.
<b>Gross et al.(24)</b>	2002	Clinical Practice Guideline with high standard systematic review	1+	MND with/without radicular findings/cervicogenic headache Exclusion: long-tract, pathologies, non-cervicogenic headache, fracture/dislocation	Pain, disability/function, patient satisfaction. Risk of adverse effects	S/R	Significant P-values for pain, function, satisfaction. Actual figures not stated, but plotted on graph		True risks are unclear. Advise pt. Overall multimodal care is the recommendation, not manip/mob. on own. Use clinical judgement with use of modalities as there is limited evidence to support/not support their use.

<b>Pietrobon et al.(47)</b>	2002	Systematic Review	2+	Evaluations of neck pain/dysfunction specifically. Exclusion: Non-English articles, abstracts, and unpublished documents	Validity, reliability and responsiveness to change	S/R	Neck Disability Index correlation of .6 with VAS, .7 with McGill Pain Questionnaire. Copenhagen Neck Functional Disability Scale Test-Retest Pearson correlation of .99, against VAS r = .83 Responsiveness to change: moderate Northwick Park Neck Pain Questionnaire: Test-retest Kappa coefficient of .62, no validity reported Neck Pain and Disability Scale: Face validity high with pts. Patient Specific Functional Scale: Test-Retest r = .92	NDI most validated by the literature.
<b>Rosenfeld et al.(53)</b>	2003	RCT	1+	WAD in adults post-MVA Exclusion: fracture, neurologic deficit, head injury, previous chronic neck problems, alcohol abuse, dementia, mental disease, fatal disease	6 mos. and 3 yrs. VAS, cervical ROM, sick leave	4 groups: Active intervention N = 24 Standard intervention N = 26 Active intervention with a 14 day delay N = 22 Standard intervention with a 14 day time delay N = 25	Pain intensity and sick leave were significantly reduced (p<.05) if pts. Received active intervention vs standard. Delaying intervention was not significant. At 3 yr follow-up the early active group had a total cervical ROM similar to that of matched uninjured individuals.	Active intervention is favoured over standard rest and collar.

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<b>Scholten – Peeters et al.(55)</b>	2002	Clinical Practice Guideline	1-	WAD pts., outcome measures that were functional, activity oriented and within physiotherapy scope, treatment consisted of physiotherapy interventions, English, Dutch, German and French. Excludes WAD III		S/R 21 articles selected for the guideline. As well Quebec Task Force(60) and Magee systematic review used.	Evidence graded and recommendations drawn from them.	Methodology adequate. Does not cover WAD III. Favours active intervention.
<b>Verhagen et al.(70)</b>	2004	Cochrane Systematic Review	1++	RCT's which examined patients with WAD, conservative treatments, used functional outcome measures and were published in English, German, Dutch or French	Pain, functional outcomes, ROM, Perceived global improvement.	S/R 15 studies chosen.(1;3;4;14;16;17;38;39;46;49;52;59;63) 3 studies not applicable to this guideline.	CI data shown graphically. Conflicting data between studies re. The significance of active vs passive treatment. Both appear to decrease pain and increase function.	Trend is active treatment is better, but not totally supported by data.

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**Appendix 8: Studies excluded after review**

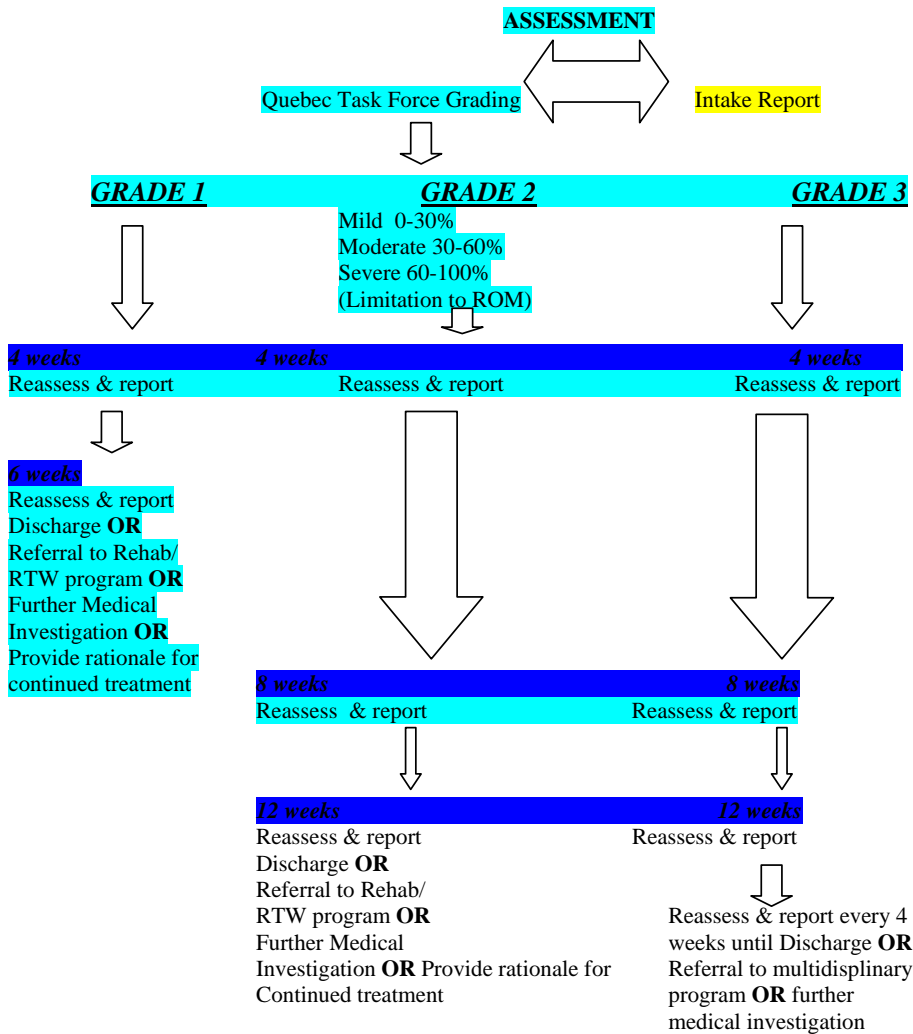
<b><u>Study ID</u></b>	<b><u>Reason for exclusion</u></b>
<b>Cote 2001</b>	The study does not apply to the recommendations, however is an applicable additional reference.
<b>Kasch 2003</b>	Poor quality random control trial with especially poor comparison group of WAD to ankle injury.
<b>Kyhlback 2002</b>	Does not provide evidence for recommendations.
<b>McClune 2002</b>	Narrative review. Not systematic, but still provides a good overview.
<b>Thuile 2002</b>	Reviewed by Verhagen et al. in systematic review.

**Appendix 9: PARALLEL FLOW CHART OF TREATMENT AND REPORTING  
FOR PATIENTS WITH WAD I TO III**

Assessment: Grade 0, 1, 2 (mild, moderate, severe), 3, 4, exceptions

If grade 0: report and discharge (no further intervention).  
If grade 4: immediate referral to specialist or emergency.

**For Grade I to III WAD:**



**Appendix 10****Exceptions to Guideline Treatment Model**

The Guideline is designed for treatment of soft tissue injuries of the spine. The following list of conditions does not meet the WAD criteria model, but can still be treated using the Grade 3 or Grade 4 guidelines.

- **Injuries resulting in significant structural damage**
  - a) Fractures, especially with delayed bone union
  - b) Joint damage
    - Intra-articular fractures (ORIF/OREF)
      - Complex Joint Dislocation (Shoulder, Patella)
      - Traumatic Onset Adhesive Capsulitis
      - Articular Derangement (Meniscal tear or loose body)
      - Capsulo-Ligamentous injury (ACL, MCL tear)
      - Surgical Joint Reconstruction (acromioplasty, THA, TKA)
    - c) Musculo-Tendinous injury managed surgically
- **Individuals with Neurological Disorders**
  - a) Central Nervous System
    - Mild/Moderate Brain Injury with associate Physical or Cognitive Dysfunction
    - Spinal Cord Injury (with partial or complete deficit)
    - Acute Spinal Traumatic Injury (with upper motor neuron lesion signs)
  - b) Peripheral Nervous System
    - Plexus Traction/Compression Injury confirmed by Electrophysiological testing
    - Cauda Equina injury
    - Acute Spinal Traumatic Injury (with radicular signs)
    - Acute traumatic Peripheral nerve traction/compression injury confirmed by Electrophysiological testing
- **Pre-existing or co-morbid conditions that compromise functional recovery**
  - a) Congenital and acquired anomalies (spondylolisthesis, spinal stenosis)
  - b) Systemic medical conditions including
    - arthritic conditions ( RA, Lupus, significant OA)
    - Metabolic disorders (diabetes, thyroid deficiency)
    - Neurological Conditions (MS, CP)
    - Vascular compromise (heart or peripheral vascular disease)
- **Individuals with documented Medical Complications:**
  - DVT   b) Sepsis   c) Hemarthrosis

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