



Original Research

Comparing 2 Whiplash Grading Systems to Predict Clinical Outcomes



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Abstract

Objective: Two whiplash severity grading systems have been developed: Quebec Task Force on Whiplash-Associated Disorders (QTF-WAD) and the Croft grading system. The majority of clinical studies to date have used the modified grading system published by the QTF-WAD in 1995 and have demonstrated some ability to predict outcome. But most studies include only injuries of lower severity (grades 1 and 2), preventing a broader interpretation. The purpose of this study was assess the ability of these grading systems to predict clinical outcome within the context of a broader injury spectrum.

Methods: This study evaluated both grading systems for their ability to predict the bivalent outcome, recovery, within a sample of 118 whiplash patients who were part of a previous case-control designed study. Of these, 36% (controls) had recovered, and 64% (cases) had not recovered. The discrete bivariate distribution between recovery status and whiplash grade was analyzed using the 2-tailed cross-tabulation statistics.

Results: Applying the criteria of the original 1993 Croft grading system, the subset comprised 1 grade 1 injury, 32 grade 2 injuries, 53 grade 3 injuries, and 32 grade 4 injuries. Applying the criteria of the modified (QTF-WAD) grading system, there were 1 grade 1 injury, 89 grade 2 injuries, and 28 grade 3 injuries. Both whiplash grading systems correlated negatively with recovery; that is, higher severity grades predicted a lower probability of recovery, and statistically significant correlations were observed in both, but the Croft grading system substantially outperformed the QTF-WAD system on this measure.

Conclusions: The Croft grading system for whiplash injury severity showed a better predictive measure for recovery status from whiplash injuries as compared with the QTF-WAD grading system.

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Introduction

Whiplash injuries impose a substantial public health burden. There are approximately 3 million whiplash injuries in the United States each year.^{1,2} The economic burden in the United States has been estimated to be as high as \$25 billion, and the comprehensive cost (which includes the costs of Emergency Medical Services, litigation, etc) may be as high as \$43 billion annually.³

Researchers and clinicians alike are benefited by grading schemes which foster better communication by providing a coherent common language. In 1983, Norris and Watt⁴ segmented whiplash patients into 3 groups based upon the type of symptoms or findings with which they presented. Group 1 patients had symptoms only; group 2 patients had symptoms and physical findings; group 3 patients had “objective neurological loss.” Recovery was found to be inversely related to increasing severity grade.

In 1993, a formal whiplash grading system was introduced by Croft,^{5,6} and in 1995, a modified version was published by the Quebec Task Force on Whiplash-Associated Disorders (QTF-WAD).⁷ These grading systems are compared in Table 1. Subsequent reports have indicated some correlation between outcome and grade of severity,^{8–15} but most authors have studied only grade 1 and 2 injuries.

The purpose of the present study was to assess the ability of these grading systems to predict clinical outcome using a study population that was part of a separate case-control study.¹⁶ To our knowledge, this is the first clinical study to compare these 2 whiplash grading systems and the first study to include a sample with representative proportions of all 4 grades of whiplash injuries.

Methods

Data were taken from a previous case-control study of whiplash patients. In total, 123 individuals were recruited from 12 private clinics in 9 US states. Subjects who had sustained a whiplash injury in the past were recruited and enrolled on an ongoing basis until each clinic had recruited its target number of subjects. Litigating persons were excluded. Five cases were excluded from the present study because of missing data, leaving 118 cases available for analysis. The original case-control study was approved by the Walden University institutional review board, and all subjects completed informed consent documents prior to enrollment in this study. The sample comprised 55% females and 45% males. The cases were the 64% of subjects that had not fully recovered from their injuries. The remainder claimed to have recovered from their whiplash injuries and comprised the control group. This is a representative recovery ratio for whiplash injuries.^{14,17–22}

In this study, the criteria described in Table 1 were used in the assignment of whiplash grades for grades 1–3. Treating practitioners also characterized injuries as grade 4 when magnetic resonance imaging (MRI) findings were considered to be consistent with the patient’s injuries. Relevant MRI findings would include, but not be limited to, herniations of intervertebral disks, annular tears, and type I Modic changes.

Statistical Analysis

The discrete bivariate distribution between recovery status and whiplash grade was analyzed using the 2-tailed cross-tabulation statistics module provided in SPSS 22 (IBM) statistical software.

Table 1 Comparison of the 1993 Croft Grading System and the 1995 QTF-WAD Grading System

Grade	Croft Grading System ⁵	QTF-WAD Grading System ⁷
0	N/A	No neck complaints; no physical sign(s)
1	<i>Minimal</i> : neck pain; no limitation of motion, ligamentous injury, or neurological symptoms present	Neck complaint of pain, stiffness, or tenderness only; no physical signs
2	<i>Slight</i> : neck pain with limitation of motion; no ligamentous injury or neurological symptoms present	Neck complaint AND musculoskeletal sign(s) ^a
3	<i>Moderate</i> : neck pain with limitation of motion; some ligamentous injury; neurological symptoms may be present	Neck complaint AND neurological sign(s) ^b
4	<i>Moderate to severe</i> : neck pain with limitation of motion; ligamentous instability; neurological symptoms present; fracture or disc derangement	Neck complaint AND fracture or dislocation
5	<i>Severe</i> : requires surgical management	n/a

N/A, not applicable; QTF-WAD, Quebec Task Force on Whiplash-Associated Disorders.

^a Musculoskeletal signs include decreased range of motion and point tenderness.

^b Neurological signs include decreased or absent deep tendon reflexes, weakness, and sensory deficits.

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