NPTF: Treatment & Prognosis of Neck Pain

Does structured patient education improve the recovery and clinical outcomes of patients with neck pain? A systematic review from the Ontario Protocol for Traffic Injury Management (OPTIMa) Collaboration

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Abstract

BACKGROUND CONTEXT: In 2008, the Bone and Joint Decade 2000 to 2010 Task Force on Neck Pain and Its Associated Disorders recommended patient education for the management of neck pain. However, the effectiveness of education interventions has recently been challenged.

PURPOSE: To update the findings of the Bone and Joint Decade 2000 to 2010 Task Force on Neck Pain and Its Associated Disorders and evaluate the effectiveness of structured patient education for the management of patients with whiplash-associated disorders (WAD) or neck pain and associated disorders (NAD).


FDA device/drug status: Not applicable.


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PATIENT SAMPLE: Randomized controlled trials that compared structured patient education with other conservative interventions.

OUTCOME MEASURES: Self-rated recovery, functional recovery (eg, disability, return to activities, work, or school), pain intensity, health-related quality of life, psychological outcomes such as depression or fear, or adverse effects.

METHODS: We systematically searched eight electronic databases (MEDLINE, EMBASE, CINAHL, PsycINFO, the Cochrane Central Register of Controlled Trials, DARE, PubMed, and ICL) from 2000 to 2012. Randomized controlled trials, cohort studies, and case-control studies meeting our selection criteria were eligible for critical appraisal. Random pairs of independent reviewers critically appraised eligible studies using the Scottish Intercollegiate Guidelines Network criteria. Scientifically admissible studies were summarized in evidence tables and synthesized following best-evidence synthesis principles.

RESULTS: We retrieved 4,477 articles. Of those, nine were eligible for critical appraisal and six were scientifically admissible. Four admissible articles investigated patients with WAD and two targeted patients with NAD. All structured patient education interventions included advice on activation or exercises delivered orally combined with written information or as written information alone. Overall, as a therapeutic intervention, structured patient education was equal or less effective than other conservative treatments including massage, supervised exercise, and physiotherapy. However, structured patient education may provide small benefits when combined with physiotherapy. Either mode of delivery (ie, oral or written education) provides similar results in patients with recent WAD.

CONCLUSIONS: This review adds to the Bone and Joint Decade 2000 to 2010 Task Force on Neck Pain and Its Associated Disorders by defining more specifically the role of structured patient education in the management of WAD and NAD. Results suggest that structured patient education alone cannot be expected to yield large benefits in clinical effectiveness compared with other conservative interventions for patients with WAD or NAD. Moreover, structured patient education may be of benefit during the recovery of patients with WAD when used as an adjunct therapy to physiotherapy or emergency room care. These benefits are small and short lived. © 2014 Elsevier Inc. All rights reserved.

Keywords: Whiplash-associated disorders; Neck pain and associated disorders; Patient education; Recovery; Outcome; Systematic review

Introduction

Most people experience neck pain during their lifetime [1]. Neck pain is a prevalent source of disability, whether attributed to work, injury, or activities of daily living [1,2]. Neck pain is a common reason for consulting a healthcare provider [3]. Although the course of neck pain is favorable for most people, 47% of individuals with prevalent neck pain report persistent neck problems 1 year later [2,4]. Moreover, 23% of individuals who recover from an episode of neck pain will develop a subsequent episode in the months after their recovery [2].

Multiple clinical interventions are available to clinicians, but the effects of the interventions are limited and short term [5]. In 1995, the Quebec Task Force on whiplash-associated disorders (WAD) used clinical consensus to recommend that the acute management of neck pain should include reassurance and promotion of activities through patient education [6]. Patient education has become routine practice for the management of WAD and neck pain and associated disorders (NAD), despite a lack of scientific evidence supporting this recommendation [7,8]. More recently, patient education was recommended as likely helpful (ie, worth considering) for WAD by The Bone and Joint Decade 2000 to 2010 Task Force on Neck Pain and Its Associated Disorders (NPTF) [9]. In its systematic review, the NPTF reported evidence from two studies that an educational video in combination with usual emergency care was more effective than emergency care alone in reducing pain [5,10,11]. However, the NPTF found evidence that patient education was not more effective than other clinical interventions for managing NAD [5,12,13]. Therefore, it is appropriate to determine whether there is new evidence to support the recommendation to use patient education for the management of neck pain.

Several systematic reviews have investigated the effectiveness of patient education for the management of WAD and NAD since the publication of the NPTF [14–18]. Only one of these reviews reported that education was superior to other interventions in reducing pain and disability [16]. However, these conclusions were based on the pooling of heterogeneous education interventions (including education as part of multimodal care) in heterogeneous populations. Moreover, low-quality studies were included in these systematic reviews, which likely impacted results [19,20].

A main challenge in reviewing whether patient education is effective for the management of neck pain is the heterogeneity of methods used to educate patients. Education is routinely delivered through pamphlets, books, videos, neck schools, discussion with healthcare providers, or the Internet [15]. Moreover, education represents a broad
collection of interventions that aim to provide patients with self-management strategies. As such, the content of the education varies across interventions and may include reassurance, advice on activation, expected pain and its mechanism, stress-coping skills, workplace ergonomics, self-care strategies, exercises, general health, or education concurrent with other treatments [15]. Therefore, there is a need to determine the effectiveness of patient education by synthesizing the evidence according to the content and mode of delivery of the education intervention.

Pedagogy (the science and practice of education) has a rich philosophical, theoretical, and empirical foundation. It can be argued that education interventions for specific populations (in this case, patients with neck pain) should base their content and mode of the delivery of the intervention on well-formulated and empirically validated health education models. Furthermore, the particular philosophy and model adopted to guide the development of the educational intervention should reflect the goals of that specific educational endeavor [21]. Where the development of an educational intervention for patients is founded in both relevant theory and in models that have a sound empirical basis, its usefulness in a particular setting can be more effectively tested in a well-conducted study. Among the many models that have been described in the literature, one example of a model used to guide the development of patient educational interventions is the health belief model, which is based on behavioral theories and is frequently used in health research to explain health behaviors [22,23]. Among other components, this model addresses patients’ health beliefs/perceptions of the health condition in question along with their perceptions of the benefits and barriers involved in modifying their behavior and has been used to design patient educational interventions for a variety of health conditions [23,24].

The purpose of this systematic review is to update the findings of the NPTF and evaluate the effectiveness of structured patient education interventions compared with other interventions, placebo/sham interventions, or no intervention in improving self-rated recovery, functional recovery (eg, return to activities, work, or school), or clinical outcomes (eg, pain, health-related quality of life, depression) of patients with WAD or NAD.

Methods

Registration

This review protocol was registered with the International Prospective Register of Systematic Reviews on November 5, 2012 (CRD42012003231).

Eligibility criteria

Population

Our review targeted studies of adults and children with NAD grades I, II, or III or WAD grades I, II, or III. We excluded studies of neck pain because of major structural pathology (ie, fractures, dislocations, spinal cord injury, infection, neoplasms, or systemic disease). We defined NAD according to the definition proposed by the NPTF (Table 1) [25]. The Québec Task Force classification was used to define WAD (Table 2) [6].

Interventions

We restricted our review to studies that tested the effectiveness of patient education strategies alone or in combination with other clinical interventions. Patient education has been defined as a process of enabling individuals to make informed decisions about their personal health-related behavior [23]. For the purpose of this review, we considered a patient education intervention to be a structured, standardized, and condition-specific intervention. This intervention can be differentiated from the usual clinical education that is routinely provided by clinicians in the course of clinical care by its structured nature. Therefore, we investigated structured education strategies that were delivered through pamphlets, books, videos, neck schools, discussion with health-care providers, or the Internet, where the education intervention focused on reassurance or advice on activation, exercise, expected pain and its mechanism, prognosis, stress-coping skills, workplace ergonomics, self-care strategies, or general health. We excluded education interventions that included supervised exercise or cognitive behavioral therapy.

Table 1

<table>
<thead>
<tr>
<th>Grade</th>
<th>Definition</th>
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<tr>
<td>I</td>
<td>No signs or symptoms suggestive of major structural pathology and no or minor interference with activities of daily living</td>
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<tr>
<td>II</td>
<td>No signs or symptoms of major structural pathology but major interference with activities of daily living</td>
</tr>
<tr>
<td>III</td>
<td>No signs or symptoms of major structural pathology, but presence of neurologic signs such as decreased deep tendon reflexes, weakness, or sensory deficits</td>
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<tr>
<td>IV</td>
<td>Signs or symptoms of major structural pathology</td>
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Table 2

<table>
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<tr>
<th>Grade</th>
<th>Definition</th>
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<tbody>
<tr>
<td>I</td>
<td>Subjects with neck pain and associated symptoms in the absence of objective physical signs</td>
</tr>
<tr>
<td>II</td>
<td>Subjects with neck pain and associated symptoms in the presence of objective physical signs and without evidence of neurologic involvement</td>
</tr>
<tr>
<td>III</td>
<td>Subjects with neck pain and associated symptoms with evidence of neurologic involvement including decreased or absent reflexes, decreased or limited sensation, or muscular weakness</td>
</tr>
<tr>
<td>IV</td>
<td>Subjects with neck pain and associated symptoms with evidence of fracture or dislocation</td>
</tr>
</tbody>
</table>

WAD, whiplash-associated disorders.
Comparison groups

We included studies that compared patient education to other modes of conservative care, waiting list (wait and see), or no intervention.

Outcomes

To be eligible, studies had to include one of the following outcomes: self-rated recovery, functional recovery (eg, disability, return to activities, work, or school), pain intensity, health-related quality of life, psychological outcomes such as depression or fear, or adverse effects.

Study characteristics

Eligible studies met the following criteria: English language; studies published from January 1, 2000 to November 2, 2012 that had not been reviewed by the NPTF; randomized controlled trials (RCTs), cohort studies, or case-control studies; and included an inception cohort of a minimum of 30 participants per treatment arm with a specified condition for RCTs or 100 subjects per group with the specified condition in cohort or case-control studies. We excluded studies with the following characteristics: letters, editorials, commentaries, unpublished manuscripts, dissertations, government reports, books and book chapters, conference proceedings, meeting abstracts, lectures and addresses, consensus development statements, or guideline statements; cross-sectional studies, case reports, case series, qualitative studies, narrative reviews, systematic reviews, clinical practice guidelines, biomechanical studies, or laboratory studies; or cadaveric or animal studies.

Information sources

We developed our search strategy with a health sciences librarian (Supplementary data). A second librarian reviewed the search strategy for completeness and accuracy using the Peer Review of Electronic Search Strategies checklist [26,27]. The following databases were searched: MEDLINE, EMBASE, CINAHL, PsycINFO, the Cochrane Central Register of Controlled Trials, the Database of Abstracts of Reviews of Effects, PubMed, and the Index to Chiropractic Literature. Although our search aimed to update the NPTF search (that ended in 2006), we searched all bibliographic databases from January 1, 2000 to November 2, 2012, to ensure that studies published before 2006 had been captured by the NPTF.

The search strategy was first developed in MEDLINE and subsequently adapted to the other bibliographic databases. The search terms included subject headings (medical subject headings) specific to each database and free-text words relevant to education and neck pain (NAD and WAD grades I–III). Databases containing the results of the searches were created using EndNote X6 (http://endnote.com/if/online-user-manual). Finally, we hand searched the reference lists of eligible articles. All potentially relevant citations were exported from EndNote X6 into Excel for screening.

Study selection

Studies reviewed by the NPTF were accepted by our update and synthesized with new studies identified in our review. To identify new studies, we used a two-phase screening process to select eligible studies. In Phase 1, random pairs of independent reviewers screened citation titles and abstracts to determine the eligibility of studies. Phase 1 screening resulted in studies being classified as relevant, possibly relevant or irrelevant. In Phase 2, the same-paired reviewers independently reviewed the manuscripts of possibly relevant studies to make a final determination of eligibility. Reviewers met to resolve disagreements and reach consensus on the eligibility of studies. If consensus could not be reached, then a third reviewer was used.

Assessment of risk of bias

Eligible studies were critically appraised by random pairs of independent reviewers. Internal validity was assessed using the Scottish Intercollegiate Guidelines Network (SIGN) criteria for RCTs, cohort studies, and case-control studies (Table 3) [28]. The SIGN criteria were used to qualitatively evaluate the presence and impact of selection bias, information bias, and confounding on the results of a study. We did not use a quantitative score or a cutoff point to determine the internal validity of studies [20]. Rather, the SIGN criteria were used to assist reviewers in making an informed overall judgment on the internal validity of studies. This methodology has been previously described [6,29–33].

Specifically, we critically appraised the following methodological aspects of a study: clarity of the research question, randomization method, concealment of treatment allocation, blinding of treatment and outcomes, similarity of baseline characteristics between/among treatment arms, cointervention contamination, validity and reliability of outcome measures, follow-up rates, analysis according to intention-to-treat principles, and comparability of results across study sites (where applicable). All reviewers were trained in the evaluation of studies using the SIGN criteria. Consensus between two reviewers in each pair was reached through discussion with the involvement of an independent third reviewer where necessary. Authors were contacted when additional information was needed for the critical appraisal to be accurate and valid. After critical appraisal, studies judged to have adequate internal validity were deemed scientifically admissible and included in our synthesis [34].

Data extraction and synthesis of results

We computed preconsensus reviewer agreement for the screening of the titles and abstracts and for the critical
appraisal of articles. We reported percentage agreements and kappa statistic (k) with 95% confidence interval (CI) [35,36].

The lead author extracted data from scientifically admissible studies into a Microsoft Access database, which was then used to build evidence tables (Table 4). A second reviewer independently checked the extracted data. Meta-analysis was not performed because of heterogeneity of scientifically admissible studies with respect to patient populations, interventions, comparators, and outcomes. A qualitative synthesis of findings from the scientifically admissible studies was performed to develop evidence statements according to the principles of best-evidence synthesis [34]. We used standardized cutoff values to determine if clinically significant changes were reached in each trial for common outcome measures. These include a between-group 2/10 difference on the Numeric Rating Scale (NRS) [37], 10/100 mm or 10% difference on the Visual Analog Scale [38], 5/50 difference on the Neck Disability Index [39,40], 25/100 difference on the Northwick Park Neck Pain Questionnaire [41,42], 5/100 difference on the Short-Form 12 Physical Health Summary Scale [37], and 3/10 difference on the Patient-Specific Functional Scale [43]. We stratified our results according to the type of disorder (WAD vs. NAD) and the duration of the disorder (recent [symptoms lasting <3 months] vs. persistent [symptoms lasting ≥3 months]).

Reporting

The systematic review was organized and reported based on the statement of Preferred Reporting Items for Systematic Reviews and Meta-Analyses [44].

Results

Study selection

Our search yielded 4,477 articles. We removed 995 duplicates and screened 3,482 articles for eligibility (Figure). A total of 3,473 articles did not meet our selection criteria. Nine articles were found to be eligible for critical appraisal. Of these, six articles reporting on seven studies were deemed scientifically admissible [45–50]. All six scientifically admissible articles were published between 2007 and November 2, 2012 (our update identified 10 new eligible studies [reported in 9 articles] that were not captured by the NPTF [45–53]). Of those, seven studies (reported in six articles) were accepted as scientifically admissible studies and included in our best-evidence synthesis [45–50]. One scientifically admissible article included two RCTs: Step 1 (an RCT: the Whiplash Book vs. usual care advice) followed by Step 2 (an RCT: single advice session to reinforce the education provided in Step 1 vs. physiotherapy) [48].

The interrater agreement for the screening of articles was $k=0.75$ (95% CI 0.63–0.86). The percentage
<table>
<thead>
<tr>
<th>Reference</th>
<th>Subjects and settings, number (n) enrolled</th>
<th>Interventions, no. of subjects (n)</th>
<th>Comparisons, no. of subjects (n)</th>
<th>Follow-up</th>
<th>Outcomes</th>
<th>Key findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andersen et al. [45]</td>
<td>Full-time employees without disability or major disease in Copenhagen, Denmark, with ≥30 d of neck/shoulder pain in the previous year and pain intensity ≥2/10 in the last 3 mo (n = 198)</td>
<td>Exercise: 10 wk of shoulder abduction resistance training with elastic tubing for 2 min per day for 5 d per week (n = 66) or 12 min per day for 5 d per week (n = 66)</td>
<td>Information: weekly e-mailed information on various aspects (physical exercise, advice to stay active in spite of pain, diet, smoking, alcohol use, stress management, workplace ergonomics, and indoor climate) (n = 66)</td>
<td>10 wk</td>
<td>Primary outcomes: worst pain in the previous week (NRS 0–10), examiner-verified palpated tenderness of the neck/shoulder muscles (total tenderness score of 0–32), isometric muscle strength (maximal torque measured with dynamometer)</td>
<td>Compared with the information group, neck/shoulder pain and tenderness, respectively, decreased −1.4 points (95% CI −2.0, −0.7) and −4.2 points (95% CI −5.7, −2.7) in the 2-min group and −1.9 points (95% CI −2.5, −1.2) and −4.4 points (95% CI −5.9, −2.9) in the 12-min exercise group.</td>
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<td>Jull et al. [46]</td>
<td>Patients with persistent WAD Grade II (3 mo to 2 y postinjury) aged 18–65 y referred from GPs or through advertising from Queensland, Australia (n = 71)</td>
<td>MPT program including exercises, low-velocity manipulative therapy, education, and reassurance (n = 36)</td>
<td>SMP described in a booklet. The booklet discusses the mechanism of whiplash, reassurance on recovery, to stay active, ergonomic advice, and exercise (n = 35)</td>
<td>10 wk</td>
<td>Primary outcomes: self-rated neck pain and disability (NPI %) Secondary outcomes: cervical range of motion (3D external measurement device), cervical muscle test, cranio-cervical flexion test, emotional distress (GHQ-28), fear of reinjury (TSK), stress (IES), perceptions of treatment efficiency and relief (VAS)</td>
<td>Compared with SMP, MPT program had greater change in disability (−10.4% [SD 14] vs. −4.6% [SD 8.8]) Compared with SMP, MPT program improved cervical range of motion (+9.6 [SD 13.2] vs. +8.5 [SD 13.2] for flexion/extension, +14.1 [SD 11.9] vs. +9.5 [SD 9.0] for rotation, +10.2 [SD 7.1] vs. +10.6 [SD 6.7] for lateral flexion) Compared with SMP, MTP had a reduction of 5.5 points (SD 6.3) vs. 2.7 (SD 8.1) in distress, 1.3 points (SD 4.3) vs. 3.4 (SD 4.3) for fear of reinjury and 4.8 points (SD 6.4) vs. 3.4 (SD 4.3) for neck pain.</td>
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</table>
Kongsted et al. [47] Patients aged 18–70 y with mild WAD symptoms (pain intensity ≤4/10) recruited from two university research centers in Denmark within 10 d of the car collision (n=182)

Compared with SMP, MTP had greater change in perceived benefits of treatment (7.3 [SD 1.9] vs. 4.2 [SD 2.7]) and in perceived relief of symptoms (6.9 [SD 1.9] vs. 4.2 [SD 2.7])

Lamb et al., Step 1 [48,54] Patients aged >18 y with a history of WAD grades I–III of less than 6 wk in duration who attended an emergency department in the UK (n=3,851)

Oral advice by nurse during a 1-h home visit to explain favourable prognosis, importance of staying active, reducing fears about pain, expected pain, and mild painkiller if needed (n=119)

Active management advice: oral advice and the Whiplash Book (reassurance, exercise, encouragement to return to normal activities, advice against using a collar) in the ED (n=2,253)

Oral advice by nurse during a 1-h home visit to explain favourable prognosis, importance of staying active, reducing fears about pain, expected pain, and mild painkiller if needed (n=63)

Pamphlet with same advice as in oral advice from nurse (n=63)

Recovery defined neck pain and headache intensity=0 or 1 and at work, average neck pain and headache intensity (NRS 0–10), self-rated neck disability (Copenhagen Neck Functional Disability Scale)

Primary outcomes: self-rated disability (NDI %)

Secondary outcomes: health-related quality-of-life (physical and mental component scores of SF-12), number of workdays lost, self-rated benefit

Difference are reported as Whiplash Book-UCA:

No difference in self-rated disability 4 mo: 0.5% (95% CI –2.1, 3.0)
8 mo: 0.8% (95% CI –1.6, 3.1)
12 mo: 0.5% (95% CI –1.5, 2.5)

No difference (% difference) in SF-12 MCS
2 wk: –0.4% (95% CI –1.9, 1.2)
4 mo: –0.3% (95% CI –1.6, 1.0)
8 mo: –0.5% (95% CI –1.7, 0.7)
12 mo: –0.3% (95% CI –1.4, 0.9)

No difference (% difference) in SF-12 PCS
2 wk: –0.3% (95% CI –2.2, 1.5)
4 mo: –0.5% (95% CI –2.0, 1.1)
8 mo: –0.0% (95% CI –1.1, 1.0)
12 mo: 0.0% (95% CI –1.5, 1.5)

No difference in workdays lost 4 mo: –14.4% (95% CI –32.8, 9.2)

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<tr>
<td>Lamb et al., Step 2 [48,54]</td>
<td>Patients aged &gt;18 y with WAD grades I–III that persisted for 3 wk after attending emergency departments in 12 NHS trusts in England (n=599)</td>
<td>Physiotherapy including psychological strategies, self-management advice, exercises, cervical spine Maitland mobilization, and thoracic spine Maitland mobilization and manipulation (n=300)</td>
<td>A single advice session to reinforce the advice provided at Step 1, by a physiotherapist in the ED (n=299)</td>
<td>4, 8, and 12 mo</td>
<td>Primary outcomes: self-rated disability (NDI %) Secondary outcomes: health-related quality of life (physical and mental components of acute version of the SF-12), number of workdays lost, self-rated benefit</td>
<td>8 mo: −24.1% (95% CI −63.5, 57.9) 12 mo: −20.3% (95% CI −42.4, 10.2) Odds ratio (OR) for self-rated benefit 4 mo: OR=0.94 (95% CI 0.77, 1.14) 8 mo: OR=1.09 (95% CI 0.97, 1.22) OR for self-rated benefit with physiotherapy 12 mo: OR=1.28 (95% CI 1.14, 1.45) Difference in self-rated disability (physiotherapy–advice): 4 mo: −3.7% (95% CI −6.1, −1.3) 8 mo: −1.0% (95% CI −3.6, 1.6) 12 mo: −2.0% (95% CI −4.6, 0.6) No difference in mental component score of SF-12 (physiotherapy–advice): 4 mo: 1.3% (95% CI −0.9, 3.5) 8 mo: −0.3% (95% CI −2.6, 2.0) 12 mo: 0.0% (95% CI −2.2, 2.1) No difference in Physical Component Score of SF-12 (physiotherapy–advice): 4 mo: 0.2% (95% CI −1.4, 1.8) 8 mo: 0.2% (95% CI −1.5, 2.0) 12 mo: 1.1% (95% CI −0.7, 2.9) Greater % reduction in workdays lost favoring physiotherapy 4 mo: −37% (95% CI −44.4, −28.6)</td>
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<tr>
<td>Time</td>
<td>OR for self-rated benefit with physiotherapy</td>
<td>RR for improvement of $5$ points on NDI with massage</td>
<td>RR for improvement of $&gt;30%$ on symptom bothersomeness with massage</td>
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<tr>
<td>8 mo</td>
<td>$0.89$ (95% CI 0.66, 1.20)</td>
<td>$2.3$ (95% CI 4.7, 0.15)</td>
<td>$4.7$ (95% CI 1.5, 14.5)</td>
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<tr>
<td>12 mo</td>
<td>$0.98$ (95% CI 0.73, 1.32)</td>
<td>$2.0$ (95% CI 4.0, 0.03)</td>
<td>$2.1$ (95% CI 1.04, 4.2)</td>
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**Sherman et al. [49]**

Patients aged 20–64 y with persistent neck pain ($>12$ wk) enrolled in Group Health in Washington State and Idaho ($n=64$)

**Massage:** maximum 10 massages $>10$ wk with self-care Advice ($n=32$)

**Self-care book:** “What to do for a pain in the neck” (neck pain causes, neck-related headache, whiplash, exercises, posture, conventional treatment, complementary therapies, and intermittent flare-up first aid) ($n=32$)

4, 10, and 26 wk after randomization

**Primary outcomes:** self-rated disability (NDI 0–50), symptom bothersomeness (NRS 0–10)

**Secondary outcomes:**
- self-rated disability (Copenhagen Neck Functional Disability Scale), health-related quality of life (SF-36), degree of restricted activities
- Medication use in the last week
- Global self-rated improvement

**Adverse events**

Greater mean reduction in NDI ($−2.1$ [95% CI $−4.0$, $−0.03$]) and symptom bothersomeness ($−1.6$ [95% CI $−2.5$, $−0.7$]) favoring massage at 4 wk

Greater mean reduction in NDI ($−2.3$ [95% CI $−4.7$, $0.15$]) and symptom bothersomeness ($−1.2$ [95% CI $−2.5$, $0.1$]) favoring massage at 10 wk

No difference in NDI ($−1.9$ [95% CI $−4.4$, $0.63$]) and symptom bothersomeness ($−0.14$ [95% CI $−1.5$, $1.2$]) favoring massage at 26 wk

Higher percentage of massage group reporting clinically meaningful improvement
- 4 wk: NDI: 35% vs. 7%; symptom: 48% vs. 10%
- 10 wk: NDI: 39% vs. 14%; symptom: 55% vs. 25%
- 26 wk: NDI: 57% vs. 31%; symptom: 43% vs. 39%

RR for improvement of $\geq 5$ points on NDI with massage
- 4 wk: $5.1$ (95% CI 1.2, 21.3)
- 10 wk: $2.7$ (95% CI 0.99, 3.5)
- 26 wk: $1.8$ (95% CI 0.97, 3.5)

RR for improvement of $>30\%$ on symptom bothersomeness with massage
- 4 wk: $4.7$ (95% CI 1.5, 14.5)
- 10 wk: $2.1$ (95% CI 1.04, 4.2)
- 26 wk: $1.1$ (95% CI 0.7, 2.0)

**Continued**
Table 4 (Continued)

<table>
<thead>
<tr>
<th>Reference</th>
<th>Subjects and settings, number (n) enrolled</th>
<th>Interventions, no. of subjects (n)</th>
<th>Comparisons, no. of subjects (n)</th>
<th>Follow-up</th>
<th>Outcomes</th>
<th>Key findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stewart et al. [50]</td>
<td>Patients with WAD grades I and II (duration 3–12 mo) who made a claim to the Motor Accident Authority of New South Wales, Australia (n=134)</td>
<td>Supervised exercise and advice (same as advice group) by physiotherapist: 12 sessions of individualized graded exercises/6 wk (aerobic exercise, stretches, functional activities, activities to build speed, endurance and coordination, and trunk and limb strengthening exercises) and home exercise (n=66)</td>
<td>Advice by physiotherapist (standardized education): reassurance, encouragement to resume light activity alone, prognosis, and beliefs about activity resumption in three sessions (one consultation and two follow-up phone contacts) (n=68)</td>
<td>6 wk and 12 mo</td>
<td>Primary outcomes: pain intensity (NRS 0–10) Pain bothersomeness (NRS 0–10) Functional ability (PSFS 0–10) Secondary outcomes: self-rated disability (NDI 0–50) Global perceived effect (NRS −5 to 5) Health-related quality of life (SF-36), work status (employment status) Adverse events</td>
<td>Small mean differences in Copenhagen Neck Functional Disability Scale between groups 4 wk: −1.6 (95% CI −3.4 to 0.24) 10 wk: −0.7 (95% CI −2.8 to 0.15) No significant difference between groups in SF-36 Medication use increased by 14 percentage points in the self-care book group at 26 wk Higher % of massage group reporting “better” or “much better” on patient global improvement 4 wk: 58% vs. 7% 10 wk: 55% vs. 25% 26 wk: 43% vs. 25% RR for better or much better on global improvement with massage 4 wk: 8.5 (95% CI 2.0, 35.4) 10 wk: 2.2 (95% CI 1.1, 4.5) 26 wk: 1.8 (95% CI 0.8, 3.8) No moderate or severe adverse experiences were reported Greater mean improvement at 6 wk, favoring exercise and advice Pain intensity: −1.1 (95% CI −1.8, −0.3) Botherliness: −1.0 (95% CI −1.9, −0.2) Functional ability: 0.9 (95% CI 0.3, 1.6) Greater mean improvement at 6 wk, favoring exercise and advice NDI: −2.7 (95% CI −4.5, −0.9) Physical component of SF-36: 3.6 (95% CI 1.3, 6.0)</td>
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</tbody>
</table>
Mental component of SF-36: 4.6 (95% CI 1.4, 7.9)
Global perceived effect at 6 wk favoring exercise and advice: 0.9 (95% CI 0.3, 1.6)
No mean difference at 12 mo between groups
Pain intensity: −0.2 (95% CI −1.0, 0.6)
Bothersomeness: 0.3 (95% CI −0.6, 1.3)
Functional ability: 0.6 (95% CI −0.1, 1.4)
No mean difference at 12 mo between groups
NDI: −2.3 (95% CI −4.9, 0.3)
Physical component of SF-36: 1.9 (95% CI −1.4, 5.1)
Mental component of SF-36: 1.8 (95% CI 1.8, 5.4)
Global perceived effect at 12 mo exercise and advice: 0.3 (95% CI −0.5, 1.0)
No difference on work status at 6 wk and 12 mo between groups
No serious adverse events reported
agreement for the critical appraisal of articles was 85.7% based on the admissible/inadmissible results.

Study characteristics

All seven scientifically admissible studies were RCTs. Of those, two investigated the effectiveness of structured education for NAD [45,49] and five focused on structured education for those with WAD [46–48,50] (Table 4). Of the seven RCTs, four used written information alone to educate patients (4/7) [45–47,49] and four used oral advice with written material provided to cover the main points of the session (4/7) [47,48,50]. Of these, one study compared written information alone to education providing oral advice with written information [47]. None of the RCTs used oral advice alone without written information provided.

The structured education interventions varied in content but included common components (Table 5). All interventions included advice to stay active and advice to exercise [45–50]. Most education interventions provided information about pain and its mechanism (5/7) [46–49], information about prognosis (5/7) [47–50], reassurance (4/7) [46,48–50], and self-care strategies (4/7) [47–49]. Finally, three interventions (3/7) included stress-coping skills [45,47,50], two provided ergonomic advice (2/7) [45,46], and two provided general health information (2/7) [45,49].

Risk of bias within studies

Overall, the methodological quality of the scientifically admissible studies was good (Table 3) [45–50]. Most studies (6/7) used a proper randomization procedure except one study (details on randomization were not described) [50]. All studies properly concealed allocation of treatment assignment. Most of the studies (6/7) achieved proper similarity of baseline values except one study, in which there were baseline differences in the distribution of gender and compensation status [46]. All admissible studies performed an intention-to-treat analysis. The follow-up rate of subjects
Table 5
Contents of structured patient education in included studies

<table>
<thead>
<tr>
<th>Included studies</th>
<th>Advice to stay active and/or exercise</th>
<th>Information about pain and its mechanism</th>
<th>Information on prognosis</th>
<th>Reassurance</th>
<th>Advice about self-care strategies</th>
<th>Advice about stress-coping skills</th>
<th>Ergonomic advice</th>
<th>General health</th>
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<tr>
<td>Andersen et al. [45]</td>
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<td>Jull et al. [46]</td>
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<tr>
<td>Kongsted et al. [47]</td>
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<tr>
<td>Lamb et al., Step 1 [48]</td>
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<tr>
<td>Lamb et al. 2012, Step 2 [48]</td>
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<tr>
<td>Sherman et al. [49]</td>
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<tr>
<td>Stewart et al. [50]</td>
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</tbody>
</table>

Note: ✓ indicates that the content was included in structured patient education interventions, and empty cells indicate the content was not included in the structured patient education interventions.

for all studies was more than 85% with the exception of two studies by Lamb et al. [48] that reported follow-up rates of more than 70%.

The three excluded studies had biases that significantly limited their internal validity [51–53]. The limitations included unknown or unclear method of randomization (2/3) [53,54]; unclear allocation concealment (3/3) [51–53]; no information on blinding of outcome measurements (1/3) [53]; important differences in baseline characteristics between the intervention and control groups (2/3) [52,53] or no baseline characteristics provided (1/3) [51]; high attrition rates (>60%) (1/3) [52] or uneven attrition rates (2/3) [51,53]; and no intention-to-treat analysis (1/3) [53].

Summary of evidence

Recent-onset WAD

There is consistent evidence from two RCTs that different delivery modes of education, namely oral advice (as a specific intervention, Kongsted et al. [47], or integrated within usual care, Step 1 in Lamb et al. [48,54]) and written material (pamphlet [47] or the Whiplash Book alongside consultation [48,54]), provide similar effect to patients with recent WAD in improving pain, disability, and health-related quality of life (Table 3). However, a third RCT (Step 2 in Lamb et al. [48,54]) suggests that one session of oral advice aimed at reinforcing the advice provided by a physiotherapist in the emergency room (ER) is less effective than a course of physiotherapy alone in reducing workdays lost and self-rated benefit in patients with recent WAD who had initially attended an ER [48,54].

Kongsted et al. [47] compared two methods of delivering an education intervention for patients with recent mild WAD (Table 4) [47]. Oral advice given during a 1-hour home visit by a nurse (ie, consultation followed by a list of statements at the end of the session) was compared with the provision of the same information within a pamphlet. Kongsted et al. [47] found no differences between the groups suggesting that oral advice and an educational pamphlet provide similar benefits to patients with recent mild WAD. However, in that study, the maximum pain intensity was 4/10, and the median pain intensity was 2/10, which may have introduced a floor effect.

In another study, Lamb et al. [48,54] reported that usual care advice in the ER is equally effective to an active management program that included distribution of the Whiplash Book [55] (Step 1 [48,54]). Moreover, Lamb et al. [48,54] suggested in a second RCT that multimodal physiotherapy (exercise, mobilization, and advice) after initial education (as provided in Step 1) is more effective than one session of education reinforcement by a physiotherapist in improving self-rated benefit (relative risk [RR]=2.19 [95% CI 1.54, 3.11] at 4 months) and workdays lost (mean difference –37% [95% CI –37.1, –28.6] at 4 months; –26.7% [95% CI –37.1, –14.6] at 8 months) (Step 2 in Lamb et al. [48,54]).

Persistent WAD

The evidence suggests that adding a physiotherapy-based graded exercise program to a structured advice intervention leads to similar outcomes as structured education alone in patients with persistent WAD (Table 4). In New South Wales, Australia, Stewart et al. [50] studied the effectiveness of adding an individualized graded exercise program to advice provided by a physiotherapist, compared with advice alone. Although the exercise group reported a greater short-term (6 weeks) reduction in pain intensity compared with the advice group, this difference was not clinically important (difference in mean change from baseline NRS –1.1 [95% CI –1.8, –0.3]). There were no differences between groups in symptom bothersomeness or disability. After reinterpreting evidence from a second Australian RCT, we conclude that a self-management program (SMP) based on an educational booklet may be as effective as multimodal physical therapy (MPT) for patients with persistent WAD [46]. Jull et al. [46] compared the effectiveness of a SMP with MPT in improving neck pain, disability, and psychological outcomes (Table 4). The SMP was based on an educational booklet that provided information about mechanism of whiplash, reassurance on recovery, advice to stay active, ergonomic advice, and home exercise. The
MPT focused on low load exercise for the neck musculature, mobilization, education, and advice (including ergonomic advice). The authors suggested that the MPT program was superior to the SMP (Table 4). However, unadjusted differences in baseline characteristics and the clinically nonsignificant effect at 10 weeks (mean change from baseline Northwich Park Neck Pain Index –10.4% [SD 14] in MPT vs. –4.6% [SD 8.8] in SMP) lead us to a more conservative conclusion that the MPT program was likely no more effective than the SMP in improving disability and psychological outcomes.

**Persistent neck pain and associated disorders**

Evidence from one RCT indicates that a mailed “Self-Care Book” is less effective than a course of massage therapy in improving disability, bothersomeness, and self-rated improvement for patients with persistent neck pain [49]. Patients who received a maximum of 10 massages over 10 weeks reported a higher reduction in self-rated disability (RR = 5.1 [95% CI 1.2, 21.3] at 4 weeks), symptom bothersomeness (RR = 2.1 [95% CI 1.04, 4.2] at 10 weeks), and self-rated improvement (RR = 2.2 [95% CI 1.1, 4.5] at 10 weeks) compared with patients who received the Self-Care Book. However, the benefits were short lived and were limited to the period during which patients were receiving their massage therapy.

Evidence from one RCT indicates that weekly e-mailed information on general health behaviors is less effective than two shoulder abduction exercise programs in improving muscle strength and promoting recovery in workers with persistent neck pain (Table 4) [45]. In their study of full-time employees from Copenhagen, Andersen et al. [45], compared weekly e-mails to two 10-week programs of daily shoulder abduction resistance exercises (2- vs. 12-min exercise program). Weekly e-mails included information on physical exercise, advice to stay active in spite of pain, diet, smoking, alcohol use, stress management, workplace ergonomics, and indoor climate. The rate of self-reported improvement (40% in 2-min group, 49% in 12-min group, and 13% in information group) significantly favored the exercise group at the end of the intervention period (Table 4) [45].

**Adverse events**

Two studies measured adverse events [49,50]. No adverse events were reported because of the education intervention in the study by Sherman et al. [49]. Mild adverse experiences (pain during treatment, increased soreness and nausea after massage) were reported in the massage group in the same study [49]. Mild adverse events (ie, muscle pain followed by increased headaches and ongoing pain) were reported in the advice group in the study by Stewart et al. [50]. The main complaint in the advice plus exercise group was muscle pain with exercise followed by knee pain and lumbar spine pain in the same study [50].

**Discussion**

**Summary of evidence**

Overall, the evidence suggests that structured patient education alone is slightly less effective than other conservative treatments (ie, physiotherapy, supervised exercises, and massage) and advice in improving the pain, functional recovery, and clinical outcomes of patients with WAD and NAD [45,48,49,54]. However, the benefits of the other treatments are small and short lived. Although small, the value of short-lived benefits should not be overlooked. Patients with pain may benefit from this temporary improvement in pain and disability. Moreover, there is no evidence that one method of delivering an education intervention (ie, oral vs. written) is clearly more beneficial than the other [47]. In 2008, the 2000 to 2010 Bone and Joint Decade Task Force on Neck Pain and Its Associated Disorders found that an educational video (information on reassurance, returning to normal activities, home exercises, and self-care strategies) combined with usual emergency care was slightly more effective than usual emergency care alone in reducing neck pain for patients with recent WAD [5,10,11]. Our review updates the NPTF and identified evidence that suggests that adding specific structured education to physiotherapy or ER care may provide short-term benefits in patients with WAD [10,11,48,54]. Therefore, patient education should be considered an adjunct therapy to commonly used conservative treatments. Studies reported heterogeneous education interventions delivered orally, in writing or through a video. Although video medium is an effective way in knowledge transfer [10], we found no admissible evidence that favors its use compared with oral/written information. The manner in which the studies examined the effectiveness of patient education and presented their results does not permit for the identification of selected components of an education intervention that are especially beneficial to patients.

Our results differ from other recent systematic reviews [14–18]. Meeus et al. [16] recently concluded that “In acute WAD, a simple oral education session will suffice (p. 1).” In contrast, we found that structured patient education alone is not sufficient to promote the optimal recovery of patients with recent WAD. Rather, our review of the evidence suggests that patient education is effective when combined with a physiotherapy program of care or usual ER care [5,48,54]. Similarly, Gross et al. [15] recently stated that an educational video is effective for the management of acute WAD. Although we agree that an educational video provides some benefits in reducing pain, it is important to note that the positive effect is small and that education must be combined with usual ER care to be effective [10,11]. Moreover, Teasell et al. [17] reported...
that education does not provide a measurable benefit in pain reduction for patients with acute WAD. Finally, the other two systematic reviews did not find evidence to support patient education for the management of neck pain [14,18]. The difference between our conclusion and the conclusion reached by other systematic reviews is largely attributable to differences in search strategies that did not capture well-recognized articles and use of appraisal checklists (eg, adapted checklist of the Physiotherapy Evidence Database scale) that did not differentiate fatal flaws [14–18,20,56,57]. An unclear research question, including poor methodological studies, pooling heterogeneous populations, and interventions, also contributed to the differences [14–18].

None of the educational interventions tested in the reviewed studies were explicitly linked to a particular model or theory of education. Therefore, it is possible that the ineffectiveness of those educational programs reflects the lack of a sound theory used to develop and deliver the interventions. We recommend that content and delivery strategies for future educational interventions should be guided by well-founded theory-based conceptual frameworks of effective health education. Furthermore, in developing patient education interventions, attention should be paid to those health educational delivery strategies that are shown to be efficacious [58].

Moreover, the ineffectiveness of the reviewed education interventions may be related to targeting prognostic factors that are difficult to modify. Survey research indicates that the general public holds negative and pessimistic beliefs about WAD and NAD [59,60]. Moreover, there is consistent evidence that poor expectations are associated with poor recovery in patients with WAD and low back pain [61–64]. Therefore, the next generation of education interventions should aim to modify the expectations and beliefs of patients. Such interventions may require a population-based approach that focuses on modifying societal beliefs and behaviors. This approach would involve participation of the broader community including researchers, clinicians, patients, and public policy makers [65]. For example, evidence from Australia suggests that a social marketing campaign can improve the beliefs about low back pain and lead to a reduction of disability and health-care utilization [66–69]. Thus, complementary educational strategies delivered both in clinical settings and at the population health level could result in greater benefits and lessen the societal burden of NAD and WAD.

Recommending an intervention in clinical practice is a complex process that involves the consideration of multiple variables: effectiveness, cost-effectiveness, societal and ethical values, and feasibility of adoption [70]. Our review informs the debate about whether specific structured patient education should be recommended as a routine intervention for the management of WAD and NAD. We found that specific structured patient education in combination with other conservative treatments may confer small short-lived benefits in patients with WAD and that it is not associated with serious adverse events. It is important to educate patients from a societal and ethical perspective [70]. For example, in Canada, health-care providers are expected to educate patients with WAD and engage them in the management of their condition [10]. Finally, evidence about the cost-effectiveness of a patient intervention and a discussion about the feasibility of implementing the intervention need to take place before it can be effectively implemented in clinical practice.

Strengths and limitations

Our review has strengths. First, we expanded the NPTF search by searching eight electronic databases. Second, the validity of our search strategy was reviewed by a second independent librarian. Third, we used the SIGN criteria to ensure the standardization of the critical appraisal process. Fourth, we contacted authors to obtain further information on the study design [45,47]. Finally, we based our conclusion on the best scientific evidence to minimize the risk of bias associated with using low-quality studies [19,20,34].

Our review also has limitations. First, our review was restricted to English literature, which may have excluded relevant studies. However, we believe that this is an unlikely source of bias because the exclusion of non-English clinical trials from a previous meta-analysis did not lead to biased results [71]. Second, it is possible that our search may have missed potentially relevant studies because patient education when used as a control intervention is not consistently indexed. We attempted to minimize this potential source of bias by hand searching the reference lists of relevant articles. One supplemental article was found by doing so and deemed admissible in our review [45]. Finally, the generalizability of our review is limited to the study population and the types of patient education investigated in the reviewed literature. Qualitative studies were not included, which exclude patients’ lived experience with education about neck pain and its management in daily life. Therefore, we cannot comment on how patients experience, use, or value structured education interventions. It was not a limitation in our review, but we recommend considering qualitative studies to review patients’ perspectives in future reviews.

Conclusions

We found that structured patient education alone is not more effective than other conservative interventions in improving the recovery of patients with WAD or NAD. However, it may provide small and short-lived benefits to patients with WAD when used in combination with physiotherapy or ER care [10,11,48,54]. Our review suggests that the mode of delivery (ie, oral or written education) provides similar results in patients with WAD.
Acknowledgment

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Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.spinee.2014.03.039.

References