SPINE Volume 31, Number 15, pp 1652–1657
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A Psycho-Educational Video Used in the Emergency Department Provides Effective Treatment for Whiplash Injuries

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Study Design. Randomized control trial conducted between June 2000 and September 2002.

Objective. To determine whether a short psycho-educational video shown in the Emergency Department shortly after the injury would produce follow-up pain reductions and reduced medical utilization.

Summary of Background Data. Chronic pain following a whiplash injury is one example of the massive medical/legal problem of chronic muscular pain. Approaches using local pain sources (trigger points) have shown promise as treatment models for this type of pain.

Methods. 1) *Setting:* Emergency Departments (ED) and urgent care (UC) facilities. 2) *Patients:* 126 patients entering EDs or UCs. 3) *Intervention:* Patients assigned to 12-minute video or care as usual. 4) *Main Outcome Measures:* Short Form Musculoskelatal Function Assessment (SMFA), phone questionnaires assessing: narcotics use, ER use, UC use, surgical consultations, *etc.*

Results and Conclusions. Patients viewing the video had dramatically lower pain ratings at a 1-month follow (6.09 [10.6] *vs.* 21.23 [17.4], $P < 0.001$) and this pattern held for the 3- and 6-month follow-up period. Similarly, for 17 of 21 items asked at follow-up, the video group showed superior outcomes (χ^2 ranged from 5 to 35, $P < 0.05$, all). For example, 4% of video patients were using narcotics at 6 month post ED visit compared with 36% of controls. The brief psycho-educational video had a profound effect on subsequent pain and medical utilization.

Key words: whiplash prevention, trigger points, prevention. **Spine 2006;31:1652–1657**

There are an estimated 45 million emergency department (ED) visits each year that involve musculoskeletal injuries.[1] After low back pain, the second largest component of these injuries is cervical strain. There are approximately 100,000 cervical strain injuries in the United States each year.[3] In 1997, the National Center for Health Statistics reported that EDs treat the largest number of cervical strains and sprains when compared with physician offices and outpatient departments. In Canada, the average cost of these injuries is $3100 per incident.[3]

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Acknowledgment date: August 9, 2005. First revision date: September 11, 2005. Acceptance date: September 12, 2005.

The manuscript submitted does not contain information about medical device(s)/drug(s).

No funds were received in support of this work. No benefits in any form have been or will be received from a commercial party related directly or indirectly to the subject of this manuscript.

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Permanent disability is a common occurrence after acute neck sprain. Barnsley *et al*,[4] as well as others,[5,6] conclude that between 14% and 42% of patients with cervical strain injuries develop chronic pain and that approximately 10% will endure constant severe pain. Norris and Watt[7] have reported figures for persistent neck pain as high as 66% at 2 years, post sprain.

ED treatment is typically limited to prescribing ice, heat, and over-the-counter analgesics, with a recommendation that the patient contact their personal physician if symptoms continue or progress. It has been widely recognized that greater education should be provided.[8–14]

In this study, we explore the long-term outcome of providing more extensive patient education, with an orientation toward a psychophysiologic model of myofascial trigger points,[15,16] during the ED visit, by means of a video presentation.[17–21] A 12-minute video was presented by the ED staff after physician diagnosis of uncomplicated cervical strain. Patients were then followed for 6 months.

Materials and Methods

Participants. Participants consisted of 126 patients recruited from an emergency department (ED) or urgent care (UC) who were diagnosed by the physician with an acute cervical strain. Exclusion criteria included the following: 1) current fracture or dislocation (as evidenced by radiologic studies) or previous cervical spine pathology, as indicated by patient history; 2) head trauma with loss of consciousness, assessed by physician examination and patient history; 3) history of cardiovascular disease or a chief complaint that included cardiovascular symptoms; and 4) hospitalization for presenting complaints. Very few patients were excluded from the study, but approximately 20% refused to participate.

The modal participant was white, female, unmarried, college educated, and employed on a full-time basis with a mean age of 38 years. The two most prominent preexisting medical disorders noted were hypertension and back pain. By far, the most common cause of injury was from a traffic collision where the driver was rear-ended, wearing a seatbelt, and looking forward on impact. Close to half of the participants sought care immediately (within 12 hours of their injury) and mainly reported headache symptoms. The treatment rendered was mostly cervical spine radiographs and medication for pain relief.[22] [Formal data were not collected on refusal or exclusion, but data from a subsample of 50 patients were available; thus the above estimate.]

Procedures. Approval was obtained by the Institutional Review Boards at the California School of Professional Psychology, San Diego, South Coast Medical Center, Laguna Beach,

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and Lake Elsinore Family Urgent Care, Lake Elsinore. All of the facilities used were relatively low volume, "suburban" facilities. Thus, staff was able to approach each patient in an unrushed and deliberate manner. All interested and eligible participants were required to read and sign a written consent form before voluntary participation in this study. Nurses attempted to engage all potential participants with the activities connected with the study during waiting time. This produced very high compliance rates. A brief participant interview was then completed, which included treatment administered, and injury components and symptoms. In addition, a personal information form was filled out.

A pseudo-randomization occurred by alternating participants into the control or experimental group. The treatment group viewed a cervical strain psychoeducational video *via* TV/VCR on a portable cart that was easily transported to the patient bedside. Immediately after this, the experimental participants completed a pain knowledge evaluation form, given in the format of a "pop quiz," which was also given to the controls as a manipulation check. A salient feature of the treatment video was that it did not require additional personnel and costs were kept to a minimum.

Scriptwriting for the video was a collaborative effort between two clinical psychologists and a neurologist with over 50 years combined experience treating chronic pain. Technical support was provided by a production company and the video was narrated by a professional voiceover. The script was based on the education provided at the Sharp Pain Rehabilitation program and Myopoint Pain clinic. To provide a realistic picture for the viewer, real-life patients were selected who modeled a combination of actual and simulated experiences. The final video was 12 minutes in length and included the following: 1) definition and description of the physiology of a cervical strain, as described by Dr. David Hubbard, neurologist, clinical professor, and medical director of Myopoint Pain Clinic; 2) possible symptomatology within the first 48 hours (scrolling bullet points); 3) medical treatment within the first 48 hours: ice, rest, soft collar (not for support but as a reminder not to make sudden movements), and medications (take prescription as directed) in bullet point format; 4) possible symptomatology after the first 48 hours (bullet points); 5) medical treatment after the first 48 hours: heat, maintaining preinjury activity gradually (bullet points); 6) recovery period time frame; 7) muscle spindles: animated diagram and physiology demonstrating what causes continued muscle pain; 8) interview with a recovered cervical strain patient; 9) biofeedback education: demonstration with animation and physiology; 10) explanation of muscle tension and its physical and emotional triggers, as described by Dr. Ed Harpin, clinical psychologist and director of Sharp Pain Rehabilitation Program; 11) muscle tension awareness and reduction techniques: reentering the environment within which the injury occurred, anger, irritation, frustration, guarding, immobilization, and exertion can all create tension, thereby exacerbating muscle pain (bullet points); 12) home cervical stretch exercises (gentle stretch): demonstration by physical therapist with animated diagram and physiology; 13) breathing relaxation: visual display of breathing relaxation by clinical psychologist Dr. Sonia Banks, which acts to alter the physical reactions to the cause of tension; 14) follow-up: emphasis on diagnosis as muscular. Therefore, it is necessary to follow-up with health professionals trained in dealing with muscle pain disorders. 15) Summary of the main points described in the video (bullet points). [Video available on Writable CD format from the second author, R.G.]

Participants were then discharged to home with a neck strain aftercare instruction sheet. The treatment group of participants also received a video content instruction sheet, which outlined the key points covered in the video.

Follow-up contact was made *via* telephone by an interviewer or follow-up caller at 1-, 3-, and 6-month intervals. Of the aforementioned 126 participants, 10 (3 from the experimentals and 7 from the controls) were unable to be contacted after the first follow-up and 6 (3 from each group) were not able to be reached *via* phone or mail at any of the three time intervals. If contact by phone was not possible after three attempts, the questionnaires were mailed to the address provided with a stamped and addressed return envelope. The interview consisted of the Musculoskeletal Function Assessment Injury and Arthritis Survey, which includes the Short Musculoskeletal Function Assessment[23] and the Verbal Rating Scale for pain.[24] It also assessed legal involvement, disability application, income changes, use of neck brace, and life change as a result of injury other measures used in the interview were the Myalgia Treatment Outcome Comparison Study Patient Phone Questionnaire,[22] which also includes the Short Musculoskeletal Function Assessment,[23] Utilization Measures, modified from the North Carolina Back Pain Project Instruments,[25] and Patient Satisfaction. Attribution of Pain Etiology was also assessed as an exploratory measure as well as a manipulation check, using a Likert-type scale.

Participants were thanked for their participation in the study and sent a movie ticket as a token of appreciation and a means of compensation for their time commitment.

The *Attribution of Pain Etiology Questionnaire* consisted of eight items, which were part of the Myopoint Pain clinic chronic pain program workbook. These questions were formulated by the director of the Sharp Pain program from years of patient treatment. They were used in this study as a manipulation check as well as an exploratory measure to determine the participant's believed neck pain origin. The purpose of this tool was to gain insight into the patient's thinking regarding muscle as the source of their neck pain, which requires a management *versus* cure approach.

The Sharp Pain Knowledge Evaluation is a 16-item multiple-choice form developed by Reilly-Spong[26] as a part of her doctoral dissertation study. This evaluation was used as a manipulation check of pain knowledge acquired as a result of viewing the psychoeducational treatment video.

Outcome Measures. *The Short Musculoskeletal Function Assessment (SMFA)* is a 46-item questionnaire derived from the Musculoskeletal Function Assessment Instrument.[27] Thirty-four items assess patient function (Dysfunction Index) and 12 items assess how much patients are bothered by functional problems (Bother Index). More specifically, it covered three different domains in relation to muscle pain (difficulty level in relation to daily activities, problems experienced during the week, and how much the participant was bothered by problems endured during the week). Both groups were compared on their musculoskeletal functioning to assist in determining the impact of the educational treatment video.

The Utilization Measure modified from the North Carolina Back Pain Projects Instrument is a 63-item telephone measure developed by Carey *et al*.[25] The last section of this instrument: utilization of medical services and employment status was

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modified and contains such questions about treatment received, type of practitioner seen, medication usage, and days missed from work.

Level of Patient Satisfaction consisted of two questions that ask the patient to rate the overall results and satisfaction of treatment rendered.

The Verbal Rating Scale (VRS) is a common, self-report measure for rating pain intensity that is widely used in clinical pain research.[24] The VRS consisted of a horizontal verbal scale from 0 to 10, in which a 0 = "no pain," and 10 = "worst possible pain." This study used the VRS scale to measure follow-up cervical strain neck pain on one domain: severity of pain in the last week.

Legal Involvement is a one-question item that asks the injured individual if he or she is involved in legal action as a result of their injury. Other questions asked in the same format were "disability application, income changes, use of neck brace and life change as a result of injury."

Statistical Analysis. To assess the effects of the intervention, three of the continuous measures (musculoskeletal functioning, patient satisfaction, and muscle pain) were evaluated with analyses of covariance. The other series of continuous variables, utilization of medical services (composed of many categorical aspects) were analyzed by χ^2 tests. Potential covariates for this study were: demographics (age, gender, and education), medical history, legal proceedings, mechanism of injury, time since injury, injury components, and medications administered during their visit. There were two manipulation checks: muscle pain knowledge, which was examined with a *t* test for independent samples, and attribution of pain etiology, which was assessed by applying a χ^2 analysis. Sample size was determined by power analysis based on other ED educational studies.

■ Results

Group Equivalence

The two groups were compared for equivalence on the demographic variables (gender, age, height, weight, level of education, marital status, ethnicity, and employment status). As Table 1 shows, no significant differences were found for any of these variables. Similarly, treatment related variables (radiographs, narcotics, nonsteroidal anti-inflammatory drugs, *etc.*) were equivalent, as were the mechanism of injury (motor vehicle accident, overexertion, surfing, *etc.*). Initial symptoms (vomiting, nausea, dizziness, numbness, tingling, visual disturbance, time since injury, or tinnitus), were also equivalent. Six items did differ significantly between the groups; marital status, living with kids, diabetic history, psychiatric history, rheumatoid disorder, and thoracic spine radiographs. To assure that this lack of equivalence did not influence the outcome comparisons, each was used as a covariate in a logistic regression. The final results were unaffected by any of the covariates and thus percentages and means are reported without correction, although the odds ratios shown are adjusted. There was a small, but significant correlation between history of low back pain and one measure of neck pain at the 6-month follow-up ($r_{smfa} = 0.278$, $P = 0.003$, $r_{vrs} = 0.065$, not significant). Thus, history of a pain condition was somewhat associated ($r^2 = 0.08$) with long-term outcome.

Table 1. Baseline Characteristics/Group Equivalence

	Control (mean)	Experimental (mean)	*t* or χ^2	Significance
Age	39.38	35.86	1.59	0.12
Height in inches	66	67	−1.09	0.28
Weight in pounds	158	160	−3.02	0.76
Level of education	3	4	−1.07	0.29
Severity index	1.13	0.83	1.65	0.10
Gender	%	%	0.81	0.37
Male	38	46		
Female	62	54		
Marital status				
Widowed	3	0	2.03	0.15
Divorced	12	9	0.32	0.57
Living alone	22	21	0.05	0.83
Living with another adult	59	73	2.86	0.09
Race			6.37	0.17
White	74	79		
Hispanic	14	18		
Black	6	0		
Asian	3	3		
Native-American	3	0		

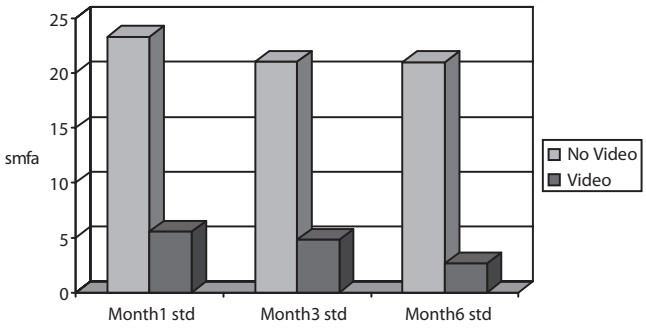

Figure 1. Short Form Musculoskeletal Function Assessment, across time.

Interview or Site Bias

Since 4 different persons were used for call back follow-ups, we analyzed the differences in response among these four. No differences among callers, sites, or the degree to which the interviewer was blind emerged as significant.

Manipulation Check

A knowledge quiz was given as a manipulation check to see if the subjects who saw the video retained any factual information. Video subjects scored 9.8 (2.6) on the quiz

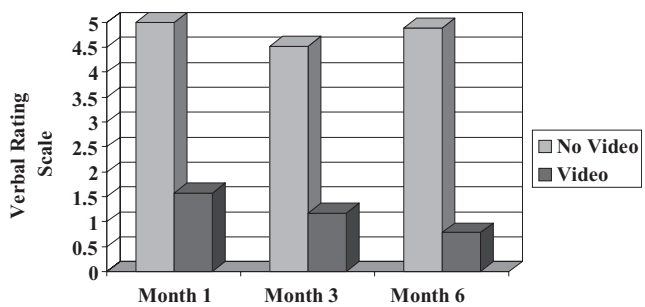

Figure 2. Verbal Rating Scale for pain, across time.

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Table 2. Results of Dichotomous Items at 1, 3, and 6 Months

Category	Control (%)	Video (%)	χ^2	Significance	ω^2	OR
Doctor visits						
Time 1	66	29	15.87	<0.001	0.4	5.22
Time 2	47	9	19.96	<0.001	0.3	13.19
Time 3	44	6	20.6	<0.001	0.35	18.64
Surgical consult						
Time 1	15	2	6.85	0.009	0.3	13.64
Time 2	19	0	11.65	<0.001	0.4	>100*
Time 3	21	0	12.47	<0.001	0.35	>100*
Emergency visit						
Time 1	19	0	11.94	<0.001	0.4	>100*
Time 2	17	0	10.37	<0.001	0.25	>100*
Time 3	10	0	5.92	0.015	0.3	>100*
Urgent care visit						
Time 1	14	0	8.44	0.004	0.35	>100*
Time 2	17	0	10.37	<0.001	0.25	>100*
Time 3	10	0	5.92	0.015	0.3	>100*
Physical therapy visit						
Time 1	58	12	26.67	<0.001	0.35	11.47
Time 2	51	9	23.18	<0.001	0.4	12.74
Time 3	21	6	5.33	0.021	0.25	13.84
Chiropractic visits						
Time 1	32	14	5.58	0.018	0.35	1.69
Time 2	26	9	5.79	0.016	0.3	1.86
Time 3	31	7	9.53	0.002	0.4	4.32
Taking narcotics						
Time 1	32	2	19.17	<0.001	0.4	27.81
Time 2	36	2	21.09	<0.001	0.35	34.14
Time 3	36	4	18.41	<0.001	0.3	14.86
Taking muscle relaxant						
Time 1	29	9	7.81	0.005	0.4	7.18
Time 2	38	4	19.73	<0.001	0.3	19.92
Time 3	29	4	12.46	<0.001	0.3	12.13
Taking NSAIDs						
Time 1	80	34	24.39	<0.001	0.4	15.66
Time 2	66	11	35.52	<0.001	0.4	22.43
Time 3	60	11	27.41	<0.001	0.35	11.12
MRI						
Time 1	5	7	.171	0.680	0.2	0.67
Time 2	8	2	2.07	0.151	0.2	4.39
Time 3	15	2	5.70	0.017	0.4	6.82
CAT scan						
Time 1	14	0	8.44	0.004	0.35	>100*
Time 2	13	2	5.22	0.022	0.2	8.49
Time 3	13	0	7.17	0.007	0.4	>100*
X-ray						
Time 1	66	14	33.20	<0.001	0.4	11.62
Time 2	26	2	13.92	<0.001	0.35	16.45
Time 3	13	0	7.17	0.007	0.4	>100*
Self-PT						
Time 1	22	16	0.814	0.367	0.2	3.86
Time 2	19	5	4.73	0.030	0.25	3.50
Time 3	21	6	5.33	0.021	0.25	5.04
Cut back activities						
Time 1	24	10	3.70	0.055	0.3	3.20
Time 2	30	4	13.99	<0.001	0.35	11.47
Time 3	10	4	1.79	0.181	0.25	1.83
Bed rest						
Time 1	34	0	23.72	<0.001	0.4	>100*
Time 2	4	0	2.15	0.142	0.25	23.53
Time 3	4	0	2.15	0.142	0.25	>100*
Neck brace						
Time 1	24	2	12.67	<0.001	0.35	18.00
Time 2	18	2	7.93	0.005	0.3	11.43
Time 3	13	0	7.17	0.007	0.4	>100*
Prayer or meditation						
Time 1	3	5	0.227	0.634	0.2	0.615
Time 2	0	4	1.93	0.165	0.25	<0.01*
Time 3	2	4	0.234	0.629	0.2	0.644
Legal involvement						
Time 1	13	9	0.455	0.500	0.2	1.32
Time 2	14	7	1.42	0.233	0.25	1.85
Time 3	13	6	1.70	0.192	0.25	2.32
Income decreased						
Time 1	12	7	0.647	0.357	0.35	1.7
Time 2	9	7	0.189	0.664	0.4	1.22
Time 3	13	7	0.745	0.388	0.2	1.89
Disability application						
Time 1	2	0	1.05	0.307	0.25	>100*
Time 2	10	0	5.54	0.019	0.35	>100*
Time 3	11	0	5.92	0.015	0.4	>100*

Time 1 = month 1 (after ER visit); Time 2 = month 3; Time 3 = month 6; OR = odds ratio, indicates that membership in the video group increased odds of this event occurring by the odds listed with the adjustment of the following variables: "never married," "live with children," "biabetic," "psychiatric history," "rheumatologic diagnosis," and "thoracic spine x-ray."
*The presence of a zero in the ratio distorts the ORs and are thus designated >100.

compared to 4.9 (2.7) for the control. This difference was highly significant ($t(124) = 10.47$, $P < 0.001$, $\omega^2 = 0.47$). It was thus concluded that the video content was retained by the experimental group, at least immediately afterwards. As an additional check, we asked the participants to rate the degree to which they attributed their pain to muscle rather than nerve or disc. Ninety-one percent of the video group attributed their pain to muscle *versus* 27% of the controls ($\chi^2 = 49.92$, $P < 0.001$).

Outcome Measures

Analyses were performed on 66 outcome measures. Some Type I error is undoubtedly created by this number of analyses. Therefore, we used a Bonferonni correction (requiring a 0.01 alpha level).

Pain Measures

Results of the SFMA (Standardized) are shown in Figure 1. As can be seen, a strong group effect was found ($F_{(1100)} = 43.65$, $P < 0.001$, $\acute{\omega}^2 = 0.304$) with no group by time interaction ($F_{(2200)} = 1.37$, $P = 0.256$, $\acute{\omega}^2 = 0.014$).

Similarly, in the Verbal Rating scale for pain (Figure 2), the video group had markedly lower pain at 1, 3, and 6 months ($F_{(1,96)} = 51.79$, $P < 0.001$, $\acute{\omega}^2 = 0.350$).

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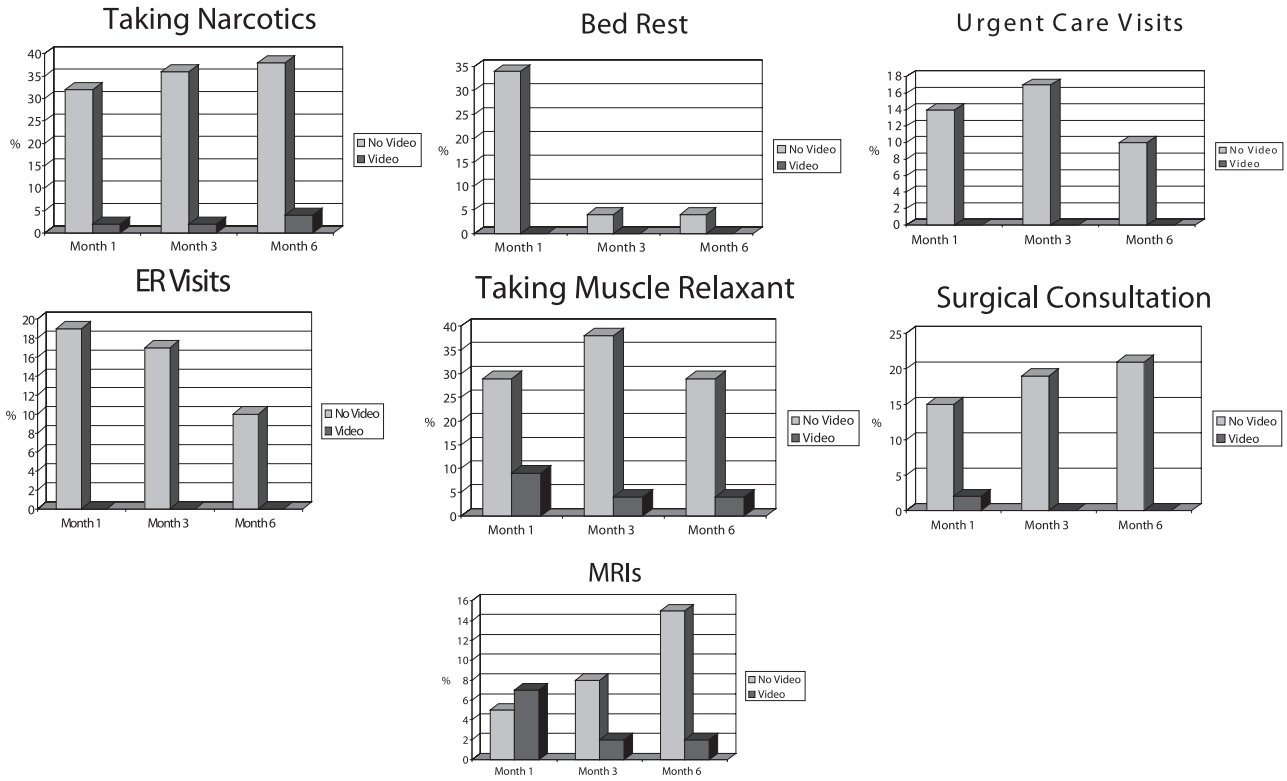

Figure 3. Percentage reporting for various outcomes, across time.

Other Continuous Measures

Three other scales were also used to assess "patient satisfaction," "life change as a result of injury," and "workdays missed." In each case, the video group was more improved than the control ($P < 0.001$), and this difference was maintained over time.

Dichotomous Variables

Twenty-one items were evaluated at call back as yes or no responses. As can be seen in Table 2, all but four of these indicated a superior result in favor of the video group. Odds ratios were used to indicate the odds of a given behavior for the video *versus* the control. For example, even controlling for age, race, psychiatric history, *etc.*, the video group was 15.6 times less likely to be taking narcotics at the 6-month mark. Figure 3 highlights some of the more striking results.

■ Discussion

This study demonstrated that a brief video emphasizing mind/body or psychophysiologic aspects of chronic pain can have dramatic effects on the severity, time course, and management of chronic cervical strain disorder. The fact that patients rated their pain as 70% lower, were using 85% less narcotic medication, over 85% fewer ER visits, and 100% fewer surgical consultations even at month 1 indicates that there was something potent in the information presented. At this time, we do not know whether this was because the patients practiced the demonstrated skills and self-management techniques as shown on the tape or if the patient experienced a cognitive shift with pain now seen as coming from muscle spindles (trigger points) that are enervated by the "fight/flight" (sympathetic) nervous system rather than from nerve or spinal pathology, which in itself dampened the sympathetic vicious cycle. Based on our previous research[15] and clinical work, we would speculate the latter. We have observed the shift in attribution preceding gains in symptom reduction in countless patients. The data indicating that attribution of pain to muscle correlated highly with pain reduction further support this hypothesis. If further research supports this current finding, they would seem to support the Hubbard and Berkoff "sympathetically mediated trigger point" theory mentioned above.[16]

Since we submitted this manuscript, another study using a similar format has been published.[28] They too showed a differential improvement in the video group but one that was much less dramatic. We speculate that there are two possible reasons for this discrepancy: 1) the sample in the Brison *et al* study[28] was more typical for urban teaching hospitals than our "suburban" sample, or 2) the trigger point content with the corresponding exercises was more effective than the "reassurance" core message used in the published study. Future research should be able to tease out the critical mechanisms and/or populations.

We, of course, cannot rule out completely the possibility that the extra attention involved in the videotape presentation may have had an impact on future symptoms. A "placebo" control condition will be needed to

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rule out this alternative. However, because the presentation was brief and imbedded in a busy sequence of events, this seems unlikely.

The other major limitation, reliance on self-report measures, will also need to be addressed by using more objective indicators. Medical record follow-up, medication usage monitoring, spouse observations, *etc*., might be used to verify the reports of patients. It does seem unlikely that patients in the video group would underreport distinct behaviors such as surgical consultation, ER visit, or use of narcotics to the degree found in the above results, but this possibility cannot be ruled out until more objective measures are used.

Overall, the data appear to offer a promising approach to secondary prevention of a massive medical/legal problem in industrialized countries.

■ Key Points

- Chronic cervical pain can be prevented by giving acute whiplash patients an educational video that emphasizes the nature of myofascial (trigger point) pain and simple behavioral and physical home interventions.
- Those patients not receiving the educational video go on to exhibit high rates of chronic pain, narcotic use, and medical utilization.

References

1. Swiontkowski MF, Chapman JR. Cost and effectiveness issues in care of injured patients. *Clin Orthop* 1995:17–24.
2. Deleted in proof.
3. Mayou R, Radanov BP. Whiplash neck injury. *J Psychosom Res* 1996;40: 461–74.
4. Barnsley L, Lord S, Bogduk N. Whiplash injury. *Pain* 1994;58:283–307.
5. Deans GT, Magalliard JN, Kerr M, et al. Neck sprain: a major cause of disability following car accidents. *Injury* 1987;18:10–2.
6. Macnab J. Acceleration extension injuries of the cervical spine. In: *The Spine*, vol. 2. Philadelphia: Saunders, 1982:647–60.
7. Norris SH, Watt I. The prognosis of neck injuries resulting from rear-end vehicle collisions. *J Bone Joint Surg Br* 1983;65:608–11.
8. Burton AK, Waddell G, Burtt R, et al. Patient educational material in the management of low back pain in primary care. *Bull Hosp Jt Dis* 1996;55: 138–41.
9. Dworkin RH. Which individuals with acute pain are most likely to develop a chronic pain syndrome? *Pain Forum* 1997;6:127–36.
10. Hayes KS. Randomized trial of geragogy-based medication instruction in the emergency department. *Nurs Res* 1998;47:211–8.
11. Larson CO, Nelson EC, Gustafson D, et al. The relationship between meeting patients' information needs and their satisfaction with hospital care and general health status outcomes. *Int J Qual Health Care* 1996;8:447–56.
12. Linton SJ, Bradley LA, Jensen I, et al. The secondary prevention of low back pain: a controlled study with follow-up. *Pain* 1989;36:197–207.
13. Raper JL. A cognitive approach to patient satisfaction with emergency department nursing care. *J Nurs Care Qual* 1996;10:48–58.
14. Schenk RJ, Doran RL, Stachura JJ. Learning effects of a back education program. *Spine* 1996;21:2183–8; discussion 2189.
15. Gevirtz RN, Hubbard D, Harpin E. Psychophysiologic treatment of chronic low back pain. *Prof Psychol* 1996;27:561–6.
16. Hubbard DR, Berkoff GM. Myofascial trigger points show spontaneous needle EMG activity. *Spine* 1993;18:1803–7.
17. Gagliano ME. A literature review on the efficacy of video in patient education. *J Med Educ* 1988;63:785–92.
18. Maller CE, Twitty VJ, Sauve A. A video approach to interactive patient education. *J Perianesth Nurs* 1997;12:82–8.
19. Nielsen E, Sheppard MA. Television as a patient education tool: a review of its effectiveness. *Patient Educ Couns* 1988;11:3–16.
20. O'Donnell CR, O'Donnell L, San Doval A, et al. Reductions in STD infections subsequent to an STD clinic visit: using video-based patient education to supplement provider interactions. *Sex Transm Dis* 1998;25:161–8.
21. Wood RY. Breast self-examination proficiency in older women: measuring the efficacy of video self-instruction kits. *Cancer Nurs* 1996;19:429–36.
22. *Myalgia Treatment Outcome Comparison Study Patient Phone Questionnaire*, unpublished questionnaire, San Diego, CA, 1998.
23. Swiontkowski MF, Engelberg R, Martin DP, et al. Short musculoskeletal function assessment questionnaire: validity, reliability, and responsiveness. *J Bone Joint Surg Am* 1999;81:1245–60.
24. Gracely RH. Methods of testing pain mechanisms in normal man. In: Melzack R, ed. *Textbook of Pain*. New York: Churchill Livingstone, 1989:269–80.
25. Carey TS, Garrett J, Jackman A, et al. Reporting of acute low back pain in a telephone interview: identification of potential biases. *Spine* 1995;20:787–90.
26. Reilly-Spong M. The sharp pain knowledge evaluation form: the role of cognitive function and patient education in outpatient treatment outcome. Unpublished doctoral dissertation, California School of Professional Psychology, San Diego, CA, 1997.
27. Engelberg R, Martin DP, Agel J, et al. Musculoskeletal Function Assessment instrument: criterion and construct validity. *J Orthop Res* 1996;14:182–92.
28. Brison RJH, Dostaler S, Leger A, et al. A randomized controlled trial of an educational intervention to prevent the chronic pain of whiplash associated disorders following rear-end motor vehicle collisions. *Spine* 2005;30:1799–807.

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