

# One-Year Follow-up Comparison of the Cost and Effectiveness of Chiropractic and Physiotherapy as Primary Management for Back Pain

## Subgroup Analysis, Recurrence, and Additional Health Care Utilization

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**Study Design.** A randomized trial was conducted in which patients with back and neck pain, visiting a general practitioner, were allocated to chiropractic or physiotherapy.

**Objectives.** To compare outcome and costs of chiropractic and physiotherapy as primary treatment for patients with back and neck pain, with special reference to subgroups, recurrence rate, and additional health care use at follow-up evaluation 12 months after treatment.

**Summary of Background Data.** Earlier studies on the effect of spinal manipulation have shown inconsistent results. Mostly they include only short-term follow-up periods, and few cost-effectiveness analyses have been made.

**Methods.** A group of 323 patients aged 18-60 years who had no contraindications to manipulation and who had not been treated within the previous month were included. Outcome measures were changes in Oswestry scores, pain intensity, and general health; recurrence rate; and direct and indirect costs.

**Results.** No differences were detected in health improvement, costs, or recurrence rate between the two groups. According to Oswestry score, chiropractic was more favorable for patients with a current pain episode of less than 1 week (5%) and physiotherapy for patients with a current pain episode of greater than 1 month (6.8%). Nearly 60% of the patients reported two or more recurrences. More patients in the chiropractic group (59%) than in the physiotherapy group (41%) sought additional health care. Costs varied considerably among individuals and subgroups; the direct costs were lower for physiotherapy in a few subgroups.

**Conclusions.** Effectiveness and costs of chiropractic or physiotherapy as primary treatment were similar for

the total population, but some differences were seen according to subgroups. Back problems often recurred, and additional health care was common. Implications of the result are that treatment policy and clinical decision models must consider subgroups and that the problem often is recurrent. Models must be implemented and tested. [Key words: chiropractic, cost-effectiveness, health care use, low back pain, neck pain, physiotherapy, randomized, recurrence] *Spine* 1998;23:1875-1884

In Sweden, health care is almost completely publicly governed and financed. Until recently, doctors of chiropractic have been able to work only as private practitioners and are privately financed. In 1989, however, they were registered by the state, after which a few health authorities established contracts with them, giving them privileges similar to those of most of the private registered physiotherapists, who are partially covered by public funds. The decision to cover this "new" treatment strategy with public funds gave rise to a need to evaluate the effects and costs as a foundation for further policy decisions. The question to be answered was, "Does chiropractic improve the management of low back or neck pain within publicly financed health care?" A recent review showed that only eight randomized studies evaluating the effect of chiropractic could be found and that the results were inconclusive.<sup>2</sup> In two of these studies, chiropractic was compared with physiotherapy.<sup>12,13,14</sup> Both studies showed better results in some subgroups of the spinal manipulation group, but the results were inconsistent both as to time of maximal effect and regarding subgroups showing the best results. Only the study by Meade et al<sup>12,13</sup> involved a long-term follow-up period (1 year or longer) to evaluate outcome and additional health care use.

In a number of previous studies, the costs of low back care have been compared between chiropractic and pri-

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marily medical providers.<sup>5,10,11,16,18</sup> All but one<sup>16</sup> limited the economic evaluation to patients in worker compensation. The study by Carey et al<sup>5</sup> is the only prospective one and the only one that studied both outcome and costs. The outcome (functional recovery, return to work, and complete recovery from low back pain) was similar for those attending chiropractors, primary care practitioners, and orthopedic surgeons, but the mean outpatient charges were highest for the patients seen by orthopedic surgeons and chiropractors and lowest for the patients treated by primary care providers. Also, in the preliminary report on the long-term follow-up comparison between chiropractic and physiotherapy, Meade et al<sup>12</sup> predicted cost savings for patients who had taken time off work. Despite the great economic importance of the problem, few cost-effectiveness analyses have been made within the area.

The objective of the current study was to compare effectiveness and costs after treatment, 6 and 12 months after randomization to the two treatment strategies—chiropractic and physiotherapy—for managing low back or neck pain. The purpose of this comparison was to provide better information to support political decision-making on the funding of different treatment strategies and for clinical decision-making. Therefore a careful description of background data and classification of patients were performed. The evaluation of effectiveness and costs performed 6 months after randomization has been reported elsewhere.<sup>17</sup> The results showed a reduction of symptoms in both groups, and no difference in effectiveness or direct or indirect costs could be found between the two groups. However, some indications of differences for subgroups were noted. The focus of this article is on the effectiveness and costs 12 months after randomization, with special reference to subgroups of patients with more or less acute or chronic conditions, recurrence rate, and additional health care use after treatment.

## ■ Methods

**Design.** In a prospective randomized pragmatic trial, patients with low back or neck pain were treated either by chiropractic or physiotherapy. The patients were included in the trial by the general practitioners in 10 primary care units in both urban and rural areas. The patients were monitored by mailed questionnaires before and after the primary treatment and 6 and 12 months after the randomization date. Participation in the study did not influence the patients' charge per session or access to either chiropractor or physiotherapist.

**Study Sample.** The study comprised 323 patients between 18 and 60 years of age, who attended a general practitioner for low back or neck problems. The main criteria for eligibility were that the patients had not received active treatment for their problems within the past month, had no contraindication to manipulation, had no other disease, were able to read and write in Swedish, and had problems relevant to chiropractic and physiotherapy. A more careful description of reasons for

exclusion and withdrawal have been presented in a previous article.<sup>17</sup>

**Outcome Measurements.** The effects of treatment strategies on perceived pain, functional status, and general health and all health care consumption related to low back and neck problems were followed.

Pain intensity on a visual analog scale (VAS, in millimeters)<sup>15</sup> with the end points 0 (no pain) and 100 (unbearable pain), pain frequency with a five-point scale, and use of painkillers with a four-point scale were used to measure pain.

Measures for function were sick leave and Oswestry low back pain disability questionnaire,<sup>9</sup> which gives scores for 10 sections on the impact on activities of daily living and social life. The results are expressed on a scale ranging from 0% (no pain or difficulties) to 100% (highest score for pain or difficulty on all items).<sup>9</sup>

General health was measured with a six-point scale and on a VAS with the end points 0 (best imaginable) and 100 (worst imaginable).

Measures for pain intensity, Oswestry score, and general health (VAS) were recognized as primary outcome measures, whereas the other measures for pain, function, and general health were considered secondary outcome measures.

Recurrence, defined as having a new attack or a flare-up of the same problem, was reported on a four-point scale (never, once, several times, continual) at the 6- and 12-month follow-up evaluations.

Direct costs related to the back or neck problems were calculated on the basis of the number of treatment sessions reported by the therapist, as was additional health care use reported by the patient. The direct costs for different types of services were calculated from the internal accounts of different care providers. In 1995 prices, the cost of one treatment session by a chiropractor was 271 Swedish crowns (SKr), calculated from the mean of the estimated market price in the county, and the cost of one treatment session by a physiotherapist in primary care was 207 SKr, calculated from the statement of accounts of one large physiotherapy unit in primary care. The average cost per service, for other, often used services, was as follows: for attending a medical doctor, 934 SKr in primary care, 2,465 SKr at hospital (radiographic magnetic resonance imaging [MRI] or computed tomography [CT] scan included), 454 SKr in private care, and 500 SKr in occupational health care; for physiotherapy, 610 SKr/hr at hospital, 213 SKr in private care, 300 SKr/hr in occupational health care, and 34,000 SKr for back surgery.

Indirect costs related to the low back and neck problems were calculated only for employed patients on the basis of the number of days off work reported by the patient. The indirect costs attributable to absence from work were estimated from the mean income in different gender and age groups, including social costs.<sup>19</sup>

**Treatment.** Each patient's treatment was at the discretion of the individual chiropractor or physiotherapist and was performed in six of nine private chiropractic clinics in the county or in the special physiotherapy department in 10 primary care centers.<sup>17</sup> None of the physiotherapists was a specialist in manipulation.

**Analysis.** The results were analyzed according to an intention-to-treat approach. The results of the two study groups were compared, as were groupings according to presence of similar problems during the previous 5 years, duration of current episode ( $\leq 1$  week, 1–4 weeks,  $\geq 1$  month), and the Oswestry score at entry ( $< 40\%/> 40\%$ ). The subgroups were selected before the statistical analysis and in accordance with previous studies.<sup>12,14</sup>

To detect any significant differences between groups, chi-squared tests were used in comparing proportions of patients. The Mann-Whitney U test was used to compare pain intensity, general health, and Oswestry scores. The differences between the mean changes in pain intensity (VAS), general health (VAS), percentage Oswestry score, and direct and indirect costs were tested by Student's unpaired *t* test, and the 95% confidence intervals (CIs) were calculated for the difference. Missing data account for slightly varying numbers in the text and tables.

## Results

A few more patients were randomly assigned to the chiropractic group ( $n = 179$ ) than to the physiotherapy group ( $n = 144$ ). The difference in proportion was not significant.<sup>17</sup> The response rate was very high: 98% of the participants completed the 12-month follow-up questionnaire (176/141 patients). The corresponding rate at 6-month follow-up was 98% (177/142 patients).

No differences in participant characteristics in the two groups were found, except for pain intensity and general health, which were estimated as slightly worse among the patients in the physiotherapy group before treatment (Table 1).

### Perception of Pain, Function, and General Health

A significant improvement in patients' health status was seen in both groups. No statistically significant differences in the changes could be seen between the two study groups concerning the primary outcome measures: pain intensity, Oswestry score, and general health (VAS) at 6- and 12-month follow-ups (Table 2). Similar proportions of patients—7% in the chiropractic group and 11% in the physiotherapy group—reported that they were part-time or full-time on sick leave at the 12-month follow-up evaluation. Neither could any difference in changes be seen concerning pain frequency, use of painkillers, or well-being.

Concerning subgroups, a few differences in improvement in Oswestry score and general health could be seen at the follow-up evaluation performed 6 months after randomization and were verified at the follow-up evaluation performed 12 months after randomization (Table 2). When the two subgroups ( $\leq 1$  week and 1–4 weeks) were combined to current duration of less than 1 month, as in previous studies,<sup>12,14</sup> the difference in Oswestry score (95% CI) at the follow-up evaluation 12 months after treatment was  $-1.01\%$  ( $-7.44;5.32$ ). If the patients with a duration of current episode of less than 1 week and a high Oswestry score at entry ( $n = 24$  and 14 persons, respectively) were combined, the result showed a difference in change in Oswestry score (95% CI) in

**Table 1. Pretreatment Characteristics of Patients According to Randomized Treatment Group: % (No.) Unless Otherwise Stated**

	Chiropractic Group (n = 179)	Physiotherapy Group (n = 144)
Mean (SD) age (yr)	41.4 (11.6)	40.5 (11.9)
Sex, % women	60 (108)	65 (94)
Similar problems during previous 5 yr	72 (129)	72 (103)
Treated for similar problems (n = 232)	70 (90)	77 (80)
Expectation: be completely restored	70 (125)	65 (93)
Localization of cause of treatment		
Neck	23 (41)	20 (29)
Back	77 (138)	80 (115)
Duration of current episode		
$\leq 1$ wk	20 (36)	17 (24)
1–4 wk	35 (63)	31 (45)
$\geq 1 > 3$ mo	11 (20)	15 (22)
$\geq 3$ mo	33 (59)	37 (53)
Pain		
Pain frequency (continual-daily)	89 (159)	88 (126)
Using pain killers (several times a day-daily)	20 (36)	26 (37)
Mean (SD) pain intensity (mm VAS)*	56 (22)	61 (21)‡
Function		
Mean (SD) Oswestry score*	35 (17)	37 (16)
Oswestry score $\geq 40\%$ pretreatment	35 (62)	42 (61)
Sick-leave (Ch n=154, Pt n=128)†	57 (87)	62 (79)
Duration of sick-leave (Ch n=87, Pt n=79)		
$\leq 1$ wk	61 (53)	58 (46)
1–4 wk	37 (32)	33 (26)
$\geq 1$ mo	2 (2)	9 (7)
General health		
Very well-rather well	58 (104)	56 (80)
Mean (SD) general health (mm VAS)†	34 (20)	39 (21)§

\* High values indicate higher degree of problems.

† Only patients at work are included, which means that those with disability pension/pension, sickness allowance, or young students are excluded.

‡  $P < 0.05$ .

§  $P < 0.01$ .

Ch = chiropractic; Pt = physiotherapy.

favor of chiropractic of  $-6.1\%$  ( $-18.5;6.3$ ) at the 12-month follow-up. The opposite was seen when the patients with a longer duration and a low Oswestry score ( $n = 62$  and 46 persons, respectively) were combined:  $6.1\%$  ( $2.5;9.7$ ).

The differences in changes between chiropractic and physiotherapy in subgroups according to secondary outcomes at the follow-up evaluation at 12 months indicated trends in the same direction as in the main outcomes.

### Primary Treatment Strategy

The mean number of treatment sessions ( $\pm$  standard deviation) during the treatment period was lower in the chiropractic group ( $4.9 \pm 2.0$ ) than in the physiotherapy group ( $6.4 \pm 5.4$ ); the difference (95% CI) was  $-1.53$  ( $-2.38; -0.68$ ). A similar difference in the average number of treatments between chiropractic and physiotherapy could be seen in most subgroups except for the subgroups of patients with an Oswestry score at entry of more than 40%, (chiropractic,  $5.2 \pm 2.3$ ; physiotherapy,  $6.4 \pm 5.7$ ) and patients with a current episode of less

**Table 2. Differences (95% Confidence Intervals) in Changes in Pain Intensity (mm, VAS), Oswestry Score (%), and General Health (mm, VA)\***

	After Treatment	At 6 Mo	At 12 Mo
All patients (n)†	Ch=172, Pt=139‡	Ch=174, Pt=140	Ch=174, Pt=140
Pain intensity	-0.16 (-6.47; 6.15)	2.52 (-4.23; 9.28)	4.20 (-2.31; 10.71)
Oswestry score	-1.49 (-5.51; 2.54)	0.36 (-4.04; 4.76)	1.47 (-2.85; 5.80)
General health	0.23 (-4.68; 5.15)	4.01 (-1.38; 9.40)	4.72 (-0.53; 9.98)‡
Similar problems previous 5 yr			
Yes n	Ch=123, Pt=99	Ch=124, Pt=101	Ch=126, Pt=101
Pain intensity	1.54 (-5.77; 8.84)	6.18 (-1.52; 13.89)	6.61 (-0.84; 14.06)‡
Oswestry score	0.63 (-4.15; 5.41)	3.02 (-2.08; 8.12)	3.38 (-1.65; 8.41)
General health	2.22 (-3.35; 7.80)	5.43 (-0.94; 11.80)‡	4.48 (-1.67; 10.63)
No n	Ch=48, Pt=40	Ch=48, Pt=38	Ch=48, Pt=39
Pain intensity	-4.40 (-17.11; 8.31)	-7.18 (-21.20; 6.75)	-2.01 (-15.37; 11.35)
Oswestry score	-7.00 (-14.49; 0.52)‡	-6.53 (-15.02; 1.95)	-3.62 (-11.88; 4.64)
General health	-4.70 (-14.89; 5.49)	0.30 (-10.13; 10.63)	5.37 (-5.00; 15.73)
Duration of current episode			
≤1 wk n	Ch=35, Pt=24	Ch=36, Pt=23	Ch=35, Pt=24
Pain intensity	3.96 (-5.60; 13.51)	-0.13 (-12.55; 12.29)	5.28 (-6.88; 17.43)
Oswestry score	-10.21 (-19.62; -0.81)§	-7.40 (-18.53; 3.72)	-5.04 (-15.61; 5.52)
General health	-0.98 (-12.92; 10.97)	-0.46 (-12.82; 11.90)	4.81 (-7.92; 17.55)
1-4 wk n	Ch=62, Pt=43	Ch=62, Pt=43	Ch=61, Pt=45
Pain intensity	4.83 (-6.33; 15.99)	4.64 (-7.10; 16.39)	5.37 (-5.42; 16.15)
Oswestry score	0.45 (-6.78; 7.68)	2.00 (-5.24; 9.24)	1.69 (-5.66; 9.04)
General health	1.51 (-7.07; 10.09)	5.46 (-3.39; 14.32)	2.17 (-6.77; 11.10)
≥1 mo n	Ch=76, Pt=71	Ch=75, Pt=71	Ch=77, Pt=71
Pain intensity	-1.57 (-10.58; 7.44)	6.26 (-3.15; 15.67)	6.11 (-3.15; 15.38)
Oswestry score	3.25 (-0.80; 7.31)‡	5.78 (1.41; 10.15)	6.83 (2.79; 10.88)¶
General health	1.31 (-5.64; 8.26)	7.89 (0.23; 15.54)§	8.84 (1.19; 15.76)§
Oswestry score at entry			
<40% n	Ch=113, Pt=82	Ch=113, Pt=81	Ch=114, Pt=82
Pain intensity	2.63 (-4.71; 9.97)	6.13 (-1.71; 14.00)	8.73 (1.46; 16.01)§
Oswestry score	-0.76 (-3.90; 2.37)	1.64 (-1.92; 5.21)	2.77 (-0.51; 6.05)‡
General health	-0.90 (-6.25; 4.46)	6.58 (0.53; 12.64)§	8.10 (2.20; 13.98)
≥40% n	Ch=58, Pt=57	Ch=60, Pt=58	Ch=59, Pt=58
Pain intensity	-7.13 (-17.54; 3.29)	-5.65 (-17.00; 5.71)	-5.98 (-17.37; 5.40)
Oswestry score	-5.75 (-13.35; 1.85)	-5.35 (-13.62; 2.92)	-4.34 (-12.29; 3.62)
General health	0.07 (-9.42; 9.57)	-2.43 (-12.32; 7.45)	-2.89 (-12.63; 6.87)

\* Mean score for chiropractic group minus mean score for physiotherapy group. A positive sign on the difference in change is in favor of physiotherapy and a negative sign is in favor of chiropractic.

† n given in the different groups is the lowest number within the group for any of the variables. The missing data vary from 1 to 3 patients in 2/3 of the subgroupings.

‡  $P < 0.10$ .

§  $P < 0.05$ .

||  $P < 0.01$ .

¶  $P < 0.001$ .

Ch = number of patients in the chiropractic group; Pt = number of patients in the physiotherapy group.

than 1 week (chiropractic,  $4.3 \pm 1.7$ ; physiotherapy,  $4.3 \pm 2.4$ ). The average length of the treatment period in weeks did not differ between the chiropractic and physiotherapy groups (chiropractic,  $4.1 \pm 3.3$ ; physiotherapy,  $4.7 \pm 4.7$ ) or among the subgroupings, with one exception: patients in the chiropractic group with no similar previous problems were treated for a shorter period ( $3.4 \pm 2.7$  weeks) than these patients in the physiotherapy group ( $5.2 \pm 4.9$  weeks; the difference (95% CI) was  $-1.8$  ( $-3.4$ ;  $-0.2$ ).

#### Recurrence Rate and Proportion of Patients Using Additional Health Care

No difference in recurrence rate appeared in the data (Table 3). Similar proportions of the patients who reported continual problems went for additional health care (chiropractic, 81%; physiotherapy, 67%). However, a higher proportion of the patients who reported two or more recurrences after treatment in the chiroprac-

tic group (64%) sought additional health care after treatment than in the physiotherapy group (42%); the difference (95% CI) was 22.1% (36.4; 7.8).

As a whole, more patients in the chiropractic group than in the physiotherapy group used additional health care after primary treatment (Table 3).

In both groups, the patients who had received additional health care after primary treatment tended to perceive less reduction of symptoms than patients who had not.

#### Type of Additional Health Care

After the primary treatment, a higher proportion of the patients in the chiropractic group (19%) than in the physiotherapy group (7%) went to the other therapists; the difference (95% CI) was 12.3% (19.5; 5.1). The proportions of patients who returned to the primary treatment form, chiropractic or physiotherapy, for additional treatment were 36% and 29%, respec-

**Table 3. Percentages (No.) of Patients Who Have Reported Recurrence and Additional Health Care Utilization\***

	Chiropractic Group	Physiotherapy Group	Difference Between Groups (95% Confidence Interval)
Recurrence after treatment–follow-up at 12 mo			
No recurrence	19 (34)	18 (25)	1.4 (10.0; -7.2)
None or one single recurrence	28 (50)	29 (41)	0.8 (11.0; -9.4)
Two or more recurrences	60 (105)	57 (78)	4.0 (15.0; 7.0)
Continual pain	12 (21)	15 (21)	-3.1 (4.5; -10.7)
Recurrence according to subgroups after treatment–follow-up at 12 mo			
Similar problems previous 5 yr.			
Yes			
None or one single recurrence	23 (29)	25 (24)	-1.5 (9.8; -12.8)
Two or more recurrences	65 (81)	62 (60)	2.9 (15.3; -9.9)
Continual pain	12 (15)	13 (13)	-1.4 (7.5; -10.3)
No			
None or one single recurrence	44 (21)	41 (16)	2.8 (23.7; -18.1)
Two or more recurrences	48 (23)	44 (17)	4.3 (25.3; -16.7)
Continual pain	8 (4)	15 (6)	-7.1 (6.7; -20.9)
Duration of current episode			
≤1 wk			
None or one single recurrence	50 (18)	54 (13)	-4.3 (21.6; -30.0)
Two or more recurrences	44 (16)	42 (10)	2.7 (28.2; -22.8)
Continual pain	6 (2)	4 (1)	1.4 (12.4; -9.6)
1–4 wk			
None or one single recurrence	34 (21)	33 (14)	1.8 (20.2; -16.6)
Two or more recurrences	57 (35)	51 (22)	6.2 (25.6; -13.2)
Continual pain	8 (5)	16 (7)	-8.1 (4.9; -21.1)
≥1 mo			
None or one single recurrence	13 (10)	19 (13)	-5.5 (6.5; -17.5)
Two or more recurrences	71 (53)	65 (45)	5.5 (20.7; -9.7)
Continual pain	16 (12)	16 (11)	0.1 (12.1; -11.9)
Oswestry score at entry			
<40%			
None or one single recurrence	26 (29)	27 (22)	-1.5 (11.1; -14.1)
Two or more recurrences	64 (72)	62 (50)	2.0 (15.8; -11.8)
Continual pain	11 (12)	11 (9)	0.5 (8.4; -9.4)
≥40%			
None or one single recurrence	36 (21)	33 (18)	2.9 (20.3; -14.5)
Two or more recurrences	53 (31)	49 (27)	3.4 (21.8; -15.0)
Continual pain	12 (7)	18 (10)	-6.3 (6.8; -19.4)
Additional health care utilization			
During treatment period	20 (35)	22 (30)	-1.7 (-10.7; 7.3)
After treatment–follow-up at 12 mo	59 (104)	41 (58)	18.0 (7.1; 28.9)†
During 0–12 mo	67 (118)	50 (70)	17.4 (6.6; 28.2)†
Additional health care utilization after treatment–follow-up at 12 mo according to subgroups			
Similar problems previous 5 yr			
Yes	66 (83/126)	48 (48/101)	18.2 (31.1; 5.5)†
No	41 (20/49)	28 (11/39)	12.6 (32.3; -7.1)
Duration of current episode			
≤1 wk	47 (17/36)	42 (10/24)	5.5 (31.1; -20.1)
1–4 wk	54 (33/61)	36 (16/45)	18.5 (37.3; -0.3)‡
≥1 mo	69 (53/77)	47 (33/71)	22.3 (37.9; 6.8)†
Oswestry score at entry			
<40%	59 (67/114)	34 (28/82)	25.2 (38.9; 11.5)§
≥40%	57 (35/61)	53 (31/58)	4.0 (21.9; -13.9)
Recurrence after treatment–follow-up at 12 mo			
None or one single recurrence	38 (19/50)	29 (12/41)	8.7 (28.1; -10.7)
Two or more recurrences	64 (67/104)	41 (32/78)	23.4 (36.7; 9.1)†
Continual pain	81 (17/21)	67 (14/21)	14.3 (40.5; -11.9)

\* Percent in the chiropractic group minus percent in the physiotherapy group.

†  $P < 0.01$ .‡  $P < 0.10$ .§  $P < 0.001$ .

tively; the difference (95% CI) was 6.5% (16.8; -3.8). The corresponding values were 23% and 25%, respectively, when patients with only one to two follow-up visits were excluded. Twenty-six percent of the patients in the chiropractic and 18% in the physiother-

apy group contacted one or more medical doctors after the treatment period; the difference (95% CI) was 7.3% (16.4; -1.8). All patients who had contacted a medical doctor also received additional chiropractic or physiotherapy.

**Table 4. Average Direct Cost per Patient in 1995 Prices During the Treatment Period and the Whole Study Period (1 U.S. dollar = 7.80 Skr, April 1997)\* and Differences Between Groups (95% Confidence Interval)**

	During Treatment Period			Whole Study Period (0–12 mo)		
	Chiropractic Group	Physiotherapy Group	Difference Between Groups (95% CI)	Chiropractic Group	Physiotherapy Group	Difference Between Groups (95% CI)
Type of health care service						
Primary treatment and follow-up visits						
Chiropractic	1318	—		1401	—	
Physiotherapy	—	1321		—	1362	
Additional health care						
Medical attendance	284	228		1016	808	
Physiotherapy	16	0		672	494	
Chiropractic	21	25		268	166	
Surgery†	—	—		382	994	
Other health care‡	5	11		314	184	
Total direct cost	1646	1585	62 (–194; 349)	4051	4010	41 (–1471; 1533)
Total direct cost						
Surgery patients excluded				3492	2943	550 (–277; 1377)
Average direct costs according to subgroups, surgery excluded						
Similar problems previous 5 yr						
Yes	1650	1510	140 (–168; 449)	3840	2860	977 (–34; 1988)§
No	1630	1700	–79 (–647; 490)	2590	3140	–533 (–1958; 852)
Duration of current episode						
≤1 wk	1400	1120	282 (–129; 492)	2860	2040	817 (–1028; 2663)
1–4 wk	1720	1710	6 (–615; 628)	3730	2740	986 (–689; 2660)
≥1 mo	1710	1620	82 (–257; 421)	3650	3380	264 (–816; 1345)
Oswestry score at entry						
<40%	1520	1460	61 (–221; 343)	3040	2270	775 (25; 1526)
≥40%	1890	1720	178 (–379; 724)	4350	3940	407 (–1404; 2217)

\* The direct costs are rounded off to the nearest ten. Direct costs in the chiropractic group minus direct costs in the physiotherapy group (95% confidence interval). A positive sign on the difference means lower costs in the physiotherapy group and a negative sign means lower costs in the chiropractic group.

† Six patients, two in the chiropractic group and four in the physiotherapy group) 34,000 Skr/surgery).

‡ Massage, naprapathy treatment (performed by alternative therapists that mainly use manipulation and soft tissue treatment), roentgenogram, participation in a special program for patients with long-term back problems (4 patients) at the university hospital during the study period.

§  $P \leq 0.10$ .

||  $P < 0.05$ .

CI = confidence interval.

In total, six patients (2%; two in the chiropractic group and four in the physiotherapy group) received surgical treatment for herniated disc during the study period. No complications attributable to treatment were reported from any therapist or patient during the study period.

### Direct Costs

The direct costs during the whole study period (0–12 months) varied considerably among individual patients in both groups. The median (quartile [Q]1;Q3) cost for the whole study period was 2,168 (1,355; 3,674) SKr in the chiropractic group and 1,656 (828; 3442) SKr in the physiotherapy group. As the procedures were few and the costs for back surgery were high, these six patients were excluded in an additional analysis and in the subgroup analyses (Table 4). No differences in direct costs were found in subgroups of patients, with two exceptions: the direct costs tended to be lower for the physiotherapy patients with an Oswestry score of less than 40% at entry and for those with similar problems previously (Table 4). Moreover, the direct costs for patients with two or more recurrences tended to be lower in the physiotherapy group; the difference (95% CI) was 703 SKr (–129;1,535).

### Indirect Costs

Only employed patients (chiropractic, 87%; physiotherapy, 89%) were analyzed with respect to indirect costs. Fifty-four percent of the patients in the chiropractic group and 50% in the physiotherapy group were on sick leave at some time during the study period, because of back problems. Forty percent of the patients in both groups were on sick leave during the treatment period (chiropractic, 61 persons; physiotherapy, 50 persons). After the treatment period and up to the follow-up examination at 12 months, similar proportions of the patients—29% (44 persons) in the chiropractic group and 31% (39 persons) in the physiotherapy group—reported that they had been on sick leave part-time or full-time because of health problems related to low back or neck. The mean number of days off work related to back problems was  $34.2 \pm 81.3$  in the chiropractic group and  $39.3 \pm 88.2$  in the physiotherapy group; the difference (95% CI) being  $-5.1$  days (–25.4; 15.2). Six persons in both groups had part-time or full-time sick leave during the whole study period, and another three individuals in the chiropractic group and five in the physiotherapy group, for more than 6 months. Consequently, the indi-

**Table 5. Average Indirect Costs per Patient SKr at 1994 Costs During the Treatment Period and After the Treatment Period for Patients at Work\* and Differences Between Groups (95% Confidence Interval)**

	During Treatment Period			Whole Study Period (0-12 mo)		
	Chiropractic Group	Physiotherapy Group	Difference Between Groups (95% CI)	Chiropractic Group	Physiotherapy Group	Difference Between Groups (95% CI)
All patients	6700	5000	1661 (-1080; 4401)	20,800	20,100	723 (-10,946; 12,393)
Surgery patients excluded				18,400	16,400	2006 (-8544; 12,556)
Average indirect costs according to subgroups						
Similar problems previous 5 yr						
Yes	7300	5900	1369 (-2122; 4860)	24,900	23,000	1914 (-13,127; 16,955)
No	5000	2700	2353 (-1497; 6203)	9500	12,400	-2884 (-16,873; 11,105)
Duration of current episode						
≤1 wk	5800	3700	2104 (-1454; 5661)	11,600	13,300	-1669 (-19,589; 16,252)
1-4 wk	8000	6700	1305 (-5118; 7727)	25,700	24,800	943 (-22,357; 24,242)
≥1 mo	6000	4400	1560 (-1891; 5010)	22,100	19,600	2559 (-15,208; 20,326)
Oswestry score at entry						
<40%	3600	3800	-254 (-2550; 2042)	11,600	12,100	-432 (-12,227; 11,353)
≥40%	12,100	6900	5215 (-747; 11,177)†	36,000	31,300	4746 (-18,041; 27,533)

\* Patients who are unemployed are excluded. The direct costs are rounded off to the nearest hundred. Indirect costs in the chiropractic group minus direct costs in the physiotherapy group (95% confidence interval). A positive sign on the difference means lower costs in the physiotherapy group and a negative sign means lower costs in the chiropractic group.

†  $P < 0.10$ .

CI = confidence interval.

rect costs varied considerably among individual patients in both groups during the study period. The differences between the two groups were small (Table 5). The median cost (Q1; Q3), was 13,797 (5,949; 34,952) SKr for the patients in the chiropractic group among those who were on sick leave at some time during the whole study period, and 13,326 (4,125; 47,438) SKr in the physiotherapy group.

## Discussion

This study was performed within primary care, because most of the patients with low back or neck pain seek a general practitioner in primary care in Sweden. This means that the patients in this study cannot be generalized to all patients with back pain, but represent a substantial proportion of patients in health care who need conservative treatment.

The research question to be answered in the study was whether chiropractic improves the management of low back or neck pain within publicly financed health care. The follow-up evaluation performed 1 year after randomization showed similar results in the chiropractic and physiotherapy groups with respect to effectiveness, recurrence rate, and costs when the groups as a whole were considered, indicating that chiropractic did not add a considerable difference in the treatment of patients with back pain. The implications for policy decisions are that from a cost-effectiveness perspective, it does not matter which strategy is chosen.

If, instead of looking at the results for the total group, the results in more homogenous subgroups are considered, which is more relevant at the clinical decision level, some differences in outcome and direct costs occurred. Patients with acute uncomplicated problems (duration

≤1 week, no history of back pain, and high Oswestry score) had better outcomes in the chiropractic group, and patients with more chronic problems (duration ≥1 month, history of back pain, and low Oswestry score) had better outcomes in the physiotherapy group. When the authors analyzed according to the subgroup of problems of less than 1 month's duration, no difference in change between the two groups (chiropractic and physiotherapy) was found. The results of the current study partly contradict and partly support the results of earlier chiropractic spinal manipulation studies.<sup>12,13,14</sup> Meade et al<sup>12</sup> concluded in their preliminary long-term follow-up analysis that chiropractic was significantly more effective than physiotherapy in the subgroups of patients with chronic (duration > 1 month) or severe back pain (high/> 40% Oswestry score initially). However, in the analysis of the total group,<sup>13</sup> the results had changed somewhat, and the subgroups of patients with short current episode (< 1 month), a high Oswestry score at entry, and a history of back pain tended to benefit more from chiropractic than physiotherapy. The results in the current study were in line with the recommendations in the consensus reports concerning low back pain.<sup>1,7</sup> In these reports, spinal manipulation, carried out by trained therapists or practitioners, was recommended for patients with acute uncomplicated low back pain without radiculopathy within the first month of symptoms. In the current study, 98% of the chiropractic patients received spinal manipulation, and 80% received spinal manipulation as the only form of treatment.<sup>17</sup> According to the results of this study, a shorter period (e.g., ≤ 1 week of symptoms) might be a more suitable recommendation for an optimal effect from spinal manipulation than 1 month as recommended.<sup>1,7</sup> For the period 1-4

weeks, the outcome was similar in the two groups in the current study. Another aspect concerning the interpretation of the results in subgroups is that two third of the patients with a short current episode ( $\leq 1$  week) scored high ( $\geq 40\%$ ) on the Oswestry score at entry, indicating that the subgroup of patients with a high Oswestry score consisted of a mixture of patients, defined either as patients with acute problems or patients with severe functional problems. In the study by Meade et al,<sup>12</sup> those authors interpreted a high Oswestry score differently, namely, as patients with severe problems only. This shows that it is important to be aware of different interpretations of self-reported outcome when comparing different studies.

Concerning the use of additional health care after treatment, the current data were similar to previously reported results. Burton et al<sup>4</sup> found that approximately two thirds of the patients with low back problems had used additional health care at the follow-up evaluation 1 year after initial treatment, and Meade et al<sup>13</sup> found the number to be approximately one third (chiropractic, 42%; physiotherapy, 31%). In the current study, 59% in the chiropractic group and 41% in the physiotherapy group used additional health care. As in the study by Meade et al,<sup>13</sup> a significantly higher proportion of the patients in the chiropractic group than those in the physiotherapy group sought additional health care after treatment. In the current study, the higher proportion of patients from the chiropractic group was seen primarily among patients with chronic problems. In Sweden, one can be suspicious of reasons for additional consumption of health care, because patients who are off work for more than 1 week have to visit a medical doctor to become sick-listed in accordance with the insurance system. However, the visits to a medical doctor did not explain the use of additional health care in the current study. Stano and Smith,<sup>18</sup> who studied patient use patterns for common low back problems, found that chiropractic providers retain more patients for subsequent episodes than medical providers. In the current study, the authors did not see any significant difference in retaining patients between the two groups. Additional health care tended to be accompanied by less reduction of symptoms in both groups. Similar findings were reported by Cherkin et al,<sup>6</sup> who found that patients with low back pain in primary care with poor outcome after 3 weeks were almost three times as likely as those with good outcomes to seek additional professional care during the following months. A significantly higher proportion of the patients in the chiropractic group than of those in the physiotherapy group in the current study went to the other therapist after treatment, which is explained not only by less reduction of symptoms, but also partly by the fact that some chiropractors referred patients to physiotherapists for additional special training. In short, reasons for health care consumption are complex and can be influenced by such factors as the need to see a medical doctor

to get a certificate for sick-leave, a bad result, recommendation of the therapist, the treatment strategy, and the patient's preference or use pattern.

Recurrence was defined as having a new attack or a flare-up of the same problem, not necessarily leading to sick-leave or the need of additional health care use. This study showed that a fairly high proportion of the patients in both groups, nearly 60%, reported two or more recurrences and another 12% in the chiropractic group and 15% in the physiotherapy group reported continual pain. The recurrence rates in this study are in line with those presented in previous studies: 45% according to Faas et al<sup>8</sup> and 62% according to Bergquist-Ullman and Larsson.<sup>3</sup> Thirty percent of the patients in the current study reported additional days off work during the year; previous studies have reported similar results (31-44%).<sup>3,20</sup> Despite reported improvement, a high proportion of the patients still experience pain after 1 year.<sup>4,21</sup> Burton et al<sup>4</sup> found that more than half of the patients had persistent pain at the follow-up evaluation 1 year after initial treatment, and Von Korff et al<sup>21</sup> observed that 69% of the patients with recent onset and 82% with nonrecent onset reported having back pain in the previous month. These studies, in addition to the current study, suggest that back pain is typically a recurrent condition, and that back pain occurs more often than has been believed previously. The results of this study suggest that the prognosis of back pain over time may be somewhat less favorable than in other reports. Because there have been very few long-term follow-up studies, the change of effect over time from different treatment methods is not discussed in the consensus reports on low back pain.<sup>1,7</sup> Therefore, there is a need for studies on the long-term effects of spinal manipulation and physiotherapy, especially for studies exceeding 1 year.

According to the subgroups, patients with acute uncomplicated problems gained more from chiropractic than from physiotherapy and at the same cost. On the other hand, patients with more chronic problems gained more from physiotherapy, and the average direct costs tended to be lower for physiotherapy for the two subgroups including patients with similar problems previously and an Oswestry score less of than 40% at entry. For subgroups of patients, therefore, one of the strategies is more cost-effective than the other. The difference in direct costs among subgroups was primarily a result of the difference in cost per treatment session for chiropractic and physiotherapy (64 SKr/treatment session).

The average indirect costs did not differ between the chiropractic and physiotherapy groups, as a whole or in subgroups. The average indirect costs were more than twice as high after the treatment period than during treatment in both groups and derived from about 30% of the patients. The indirect costs and the total costs (indirect and direct costs) varied considerably between individuals and subgroups. As a consequence, the relation between direct costs and indirect costs also varied. The



proportion of direct costs was higher among patients with a low Oswestry score at entry (18%), patients with acute uncomplicated problems (no similar problem previously [21%]), and patients with a current episode of less than 1 week (16%) than among patients with similar problems previously (12%) and those with a high Oswestry score (11%). These differences were explained primarily by the indirect costs. The results of the current study indicate that it is important to define the study population when discussing the relation of direct and indirect costs.

## Conclusion

This comparison of chiropractic with physiotherapy as a primary method of management for back pain showed equal health improvement and total cost between the two groups 12 months after initial treatment. An analysis of subgroups of patients showed that patients with acute, uncomplicated problems gained more from chiropractic than from physiotherapy at a similar direct cost. Patients with more chronic problems gained more from physiotherapy at a slightly lower or similar direct cost. Furthermore, back pain was found to be a recurrent problem that often leads to additional health care. Implications of the results in this study are that treatment policy as well as clinical decision models for patients with back pain must take into account subgroups in the population and the fact that the problem often is recurrent. Clinical decision models, including recommendation of both spinal manipulation and other physical therapy for various subgroups of patients, must be implemented and tested in the clinical setting.

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