Chiropractic Care for Patients Aged 55 Years and Older: Report from a Practice-Based Research Program

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OBJECTIVE: To characterize patients aged 55 years and older and features of chiropractic care provided to them.

DESIGN: Observational, practice-based research study.

SETTING: Chiropractic offices in the United States and Canada, 1997–1998.

PARTICIPANTS: Chiropractors in 96 practices in 32 states and two Canadian provinces collected data on 805 eligible patients aged 55 years and older during a 12-week study period.

MEASUREMENTS: In addition to questionnaires on practice characteristics, patient demographics, chief complaints, and health habits, two standardized instruments were administered: for general health status, the Medical Outcomes Study 12-Item Short-Form Health Survey (SF-12); and for disability related to chronic pain, the Pain Disability Index (PDI).

RESULTS: Of 805 study patients, 60.1% were women and 94.7% were white. Overweight patients comprised 38.6% and obese 20.6% (n = 656) of the total; 9.7% of patients were hypertensive (n = 590). Smoking was reported by 12.7% and 50.2% reported regular exercise. The Physical Component Summary scores of the SF-12 seemed somewhat lower than population norms, whereas the Mental Component Summary scores differed very little from norms. Chief complaints were predominantly pain-related (72.3%), most commonly back pain (32.9%). The PDI mean baseline score for chronic patients was 16.3 (scale, 0–70), and 40.6% of study patients reported using at least one pain medication (prescription or nonprescription) more than three times per week. More than half of complaints (54.9%) had onsets more than 6 weeks before the baseline visit. For 66.6% of subjects, a chiropractor was the only provider for their current complaint. In addition to manipulation, most common features of care were recommendations on exercise (41.0%), heat or cold applications (40.8%), and food supplements (24.5%). At 4 weeks, 19.6% were discharged, 58.8% continued treatment, and 20.1% had discontinued care (self-discharged). For these three groups, those with higher PDI mean baseline scores showed more change at 4 weeks. For patients who were discharged by the doctor, the proportion of reported pain medication use decreased 7.3% from baseline to 4 weeks, increased for patients who discontinued care, and remained about the same for those continuing care.

CONCLUSIONS: Further investigation of the PDI and a decrease in pain medication use as outcome measures seems warranted. The descriptive information in this study may assist providers of care to older adults to better understand their patients' use of chiropractic care. J Am Geriatr Soc 48:534–545, 2000.

Key words: chiropractic; practice-based research; geriatrics

In 1998, the American Geriatric Society published guidelines on the management of chronic pain in older persons.[1] These guidelines listed chiropractic among the nonpharmacologic strategies for pain management that have been helpful in some older patients.[1] This recommendation was based primarily on the fact that older adults are choosing to seek chiropractic care,[1–3] perhaps because they frequently suffer from pain related to such musculoskeletal conditions as arthritis and myofascial pain syndromes,[1,4,5] which are among the more common presenting complaints of US chiropractic patients.[6] More than 90% of US chiropractic patients seek care for musculoskeletal pain,[7] and 17% of US chiropractic patients are over age 65.[8]

However, few studies to date have addressed older adults' experience of chiropractic care specifically.[9] The purpose of this report is to describe patient characteristics and features of care provided to patients aged 55 years and older in the chiropractic practices participating in a large, practice-based, research program.

METHODS

In 1997–1998, a practice-based research (PBR) program operating in a chiropractic college research center conducted an observational study in chiropractic offices in the United States and Canada. The program, established in 1995, uses methods based on those used in practice-based research programs in family medicine. It includes training in data collection procedures of practitioners and their staff by the pro-

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gram's full-time coordinator, centralized data management by the research center, and quality assurance.[10–16]

Recruitment of Participating Chiropractors

Requirements to participate were that the chiropractor (doctor of chiropractic—DC) be licensed and practice in the United States or Canada and agree in writing to all conditions stipulated in the program's standard participation agreement. These included adherence to all study protocols, maintenance of patient confidentiality, and ethical use of all study-related information. The Institutional Review Board of the college's research center approved the program.

Seventy-two chiropractors who had already participated in the program were sent a letter inviting them to participate in the study; 30 accepted. Additional participants were recruited through three other methods: personal communication by the program staff, announcements in chiropractic professional publications, and requests to professional organization leaders to encourage their members to participate. Personal communications resulted in recruitment of nine doctors. Announcements to professional publications were made by writing press releases with the assistance of the college's marketing department. This resulted in an article in a chiropractic news publication distributed to all licensed DCs in the United States and in the recruitment of 13 doctors. Requests were made to professional organization leaders of six different prominent chiropractic technique organizations to reach chiropractors using a variety of procedures. Only one such organization, the Activator Methods group, responded, resulting in the recruitment of 44 doctors.

All participants were supplied with an approved press release about the project, promised that their names would be acknowledged in presentation of results, received reports on demographics of their patients and on baseline characteristics for the entire sample, and, after the completion of the project, each doctor and staff person received a certificate of participation. To maximize data collection at 4 weeks, all doctors who succeeded in having at least 75% of their study patients complete the 4-week forms were eligible for a drawing to win a trip to a chiropractic research conference in Washington, DC. No incentives were provided to patients.

Study Population

The study population consisted of eligible patients aged 55 years and older presenting at the participating offices during a specified 12-week period. For this study, an eligible patient was one aged 55 and older who (1) had never been treated by that practitioner before or (2) was an established patient who had not been seen by the DC for the preceding 6 months. Patients presenting for "maintenance" care—an assessment and treatment of residual musculoskeletal dysfunction on a periodic basis after an original complaint has been resolved, theoretically to prevent recurrences—were thus included provided they had not been seen for the preceding 6 months. These criteria were specified to enable us to assess patients at the beginning of a course of care. All participating practitioners also conducted a cross-sectional survey of all patients, in which every patient (new and established, all ages) who visited the office during the designated week was eligible.

Data Collection Periods

Each practitioner participated in one of four 17-week data collection periods in the 1-year study. The data collection periods were spread out over a year primarily for logistical and work load purposes. In the first week, cross-sectional data were collected on all patients, both new and established. For the next 12 weeks, eligible patients entered the study and baseline data were collected; and, finally, data were collected after a 4-week interval of care.

Practice Characteristics

Before the start of patient data collection, participating chiropractors completed a practice characteristics form.

One-Week Cross-Section Period

All new and established patients who entered the participating practices during a designated week were included. The designated week preceded the study period by 2 weeks and was uniform for all participants in that data collection period. Data collection was by patient report.

Study Period: Initial Visit and Four-Week Interval of Care

Participating doctors were assigned by the project staff to one of the four study periods spanning a year consecutively as they registered for participation. All eligible patients who entered the participating practices during the designated 12-week period were recruited into the study. Baseline data collection included both patient and doctor report (see below). The PBR data management office verified eligibility using the patient's self-reported date of birth. Data were again collected, from both the patient and the doctor, 4 weeks from each patient's baseline visit. The PBR office did not directly contact patients in this study; each practice was responsible for getting 4-week interval data from its enrolled patients.

Data Collection Instruments

Forms used were either for patient self-report or for doctor report and were either developed specifically for use in the program—on demographics, chief complaints, and health habits—or were standardized instruments in common use—the Medical Outcomes Study 12-Item Short-Form Health Survey (SF-12) and the Pain Disability Index (PDI) (see description below).

Patient Self-Report Forms

Patient report forms were versions of forms used in previous projects modified and pilot tested for this population, using feedback from focus groups conducted among local residents aged 65 years and over. They were scannable forms containing primarily closed-ended questions with explicit instructions for marking responses; "other" categories were included as appropriate. Form 1 was used in the 1-week cross-sectional study, where as forms 2 and 3 were used in the study period. The following forms were used:

1. *Patient information sheet:* a one-page scannable form on demographics and chief complaints, including age (categorical), sex, race, nature of chief complaint (pain-related or other symptoms), location of chief complaint (head, neck, back, extremities, digestive, lungs, heart/circulation, other), duration of chief complaint (categorical).
2. *Study patient information sheet:* a two-page scannable form on patient demographics, including date of birth, nature, location and duration of chief complaint, and

information on health habits and other providers seen for the chief complaint.

3. *Study patient booklet:* a four-page scannable booklet administered to eligible patients by the office staff in participating practices at the baseline visit and 4 weeks later. It included questions on health habits, lifestyle factors, nutrition, pain medication use, and interest in health-related information, as well as the SF-12 and the PDI. Information on use of pain medications was elicited to gather preliminary information on patterns of pain medication use among chiropractic patients.

The SF-12

This is a shortened version of the Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36). The SF-12 has been documented to be reliable and valid and to provide normative data.[17,18]

The PDI

This patient report instrument was used to assess the patient's perception of his or her disability associated with pain. Patient-reported symptoms of disability have been shown to be more predictive of outcomes important to patients than diagnostic tests or signs.[19] It is important to assess not only the intensity of pain, but also its impact on function and daily activities.[1,5] The PDI's seven items are answered on a scale of 0 (no disability) to 10 (complete disability) for a maximum of 70 points.[20–23] Its reliability and validity in assessing chronic pain have been established.[23,24] It has been used in the assessment of chronic pain among low back pain patients[25]; patients in a chronic pain clinic[26]; rheumatoid arthritis outpatients and inpatients[27,28]; and in a controlled study in a research clinic of chiropractic patients with chronic pelvic pain.[29] Although it is known that older patients tend to score somewhat lower on the PDI,[24] and that the PDI mean score for outpatients who have completed a course of treatment is 18.5,[22] to date there are no published data on its use in an ambulatory population of relatively healthy older adults, such as chiropractic patients, who often have chronic mild-to-moderate episodic pain. Thus we viewed the PDI baseline scores in relation to self-reported pain medication use and use of other healthcare providers to better address this issue. Furthermore, its clinical responsiveness has not been thoroughly assessed to determine its utility as an outcome assessment instrument; there are no published data on the amount of change in the PDI that would constitute a clinically significant improvement. Thus the primary purpose of using the PDI was to make an assessment of its utility as an outcome measure for future studies of older chiropractic patients, inasmuch as it is easily administered in the setting of practice-based research.

Doctor Report Forms

These three forms were also developed through modifying and pilot testing forms used in previous studies.

1. *Practice characteristics:* This form collected information on services and procedures provided routinely, including practice and practitioner demographics and an estimation of usual weekly patient volume. The form elicited information on which types of spinal adjustment—the preferred term by the profession for "spinal manipulation"—were used.
2. *Study patient intake form:* At the baseline visit, each study patient's chiropractor completed a one-page form that included height, weight, and blood pressure, use of diagnostic X-rays; International Classification of Diseases, Ninth Revision (ICD-9) codes and insurance information (e.g., use of Medicare).
3. *Four-week interval of care form:* To gather information on patient status after an interval of care, the chiropractor completed a form including number of visits, treatment administered, and disposition for each patient in the study. Treatment was further characterized by type of spinal adjustment technique and use of nonadjustive procedures, listing the most commonly used procedures identified in the *Job Analysis of Chiropractic.*[6]

Data Management and Analysis

Data were managed through the program's established methods. All data were scanned or keyed, double-entry verified, and managed in a relational database in the PBR data management office according to set protocols. Data were further managed and standardized instruments scored in SAS for Windows (Release 6.12); data were analyzed using SPSS for Windows (Release 7.5.2) and SAS.

Data were assessed at 4 weeks by patient status (discharged, discontinued, or continuing care), because this was expected to be closely related to pain and disability, and, perhaps even more important, to the office's ability to collect outcomes data in future studies. As the severity of PDI baseline scores was expected to be related both to patient status and to changes in pain and disability, the PDI was further divided into three groups of approximately equal numbers (tertiles).

Quality Assurance

The program's standard quality assurance procedures focus on (1) computer procedures including data verification and validation schemes; (2) patient number checks, in which the coordinator compares actual number of patients scheduled (from photocopies of office schedule books of a random sample of at least 10% of participating offices) to the number of patients completing data collection forms in the 1-week cross-sectional survey or age eligible patients successfully enrolled in the study period; and (3) procedures to maximize follow-up rates in studies that include an interval of care.[16]

RESULTS

Participants and Study Population

There were 121 chiropractors in 96 practices in 32 states and 2 Canadian provinces collecting patient data. Figure 1 shows the location of the chiropractors and study patients by state. A total of 8312 patients participated in the week of cross-sectional data collection. During the four 12-week baseline data collection periods, 825 patients were recruited into the study. Twenty of these were subsequently found to be ineligible at the PBR data management office; five were younger than 55 years of age, and age could not be verified for 15 patients who had either incorrectly filled out their birth date or left it blank. Therefore, 805 patients remained eligible at baseline.

Quality Assurance

For the data collection week on the cross-section of all patients in each of their offices, 19 of the 121 doctors were

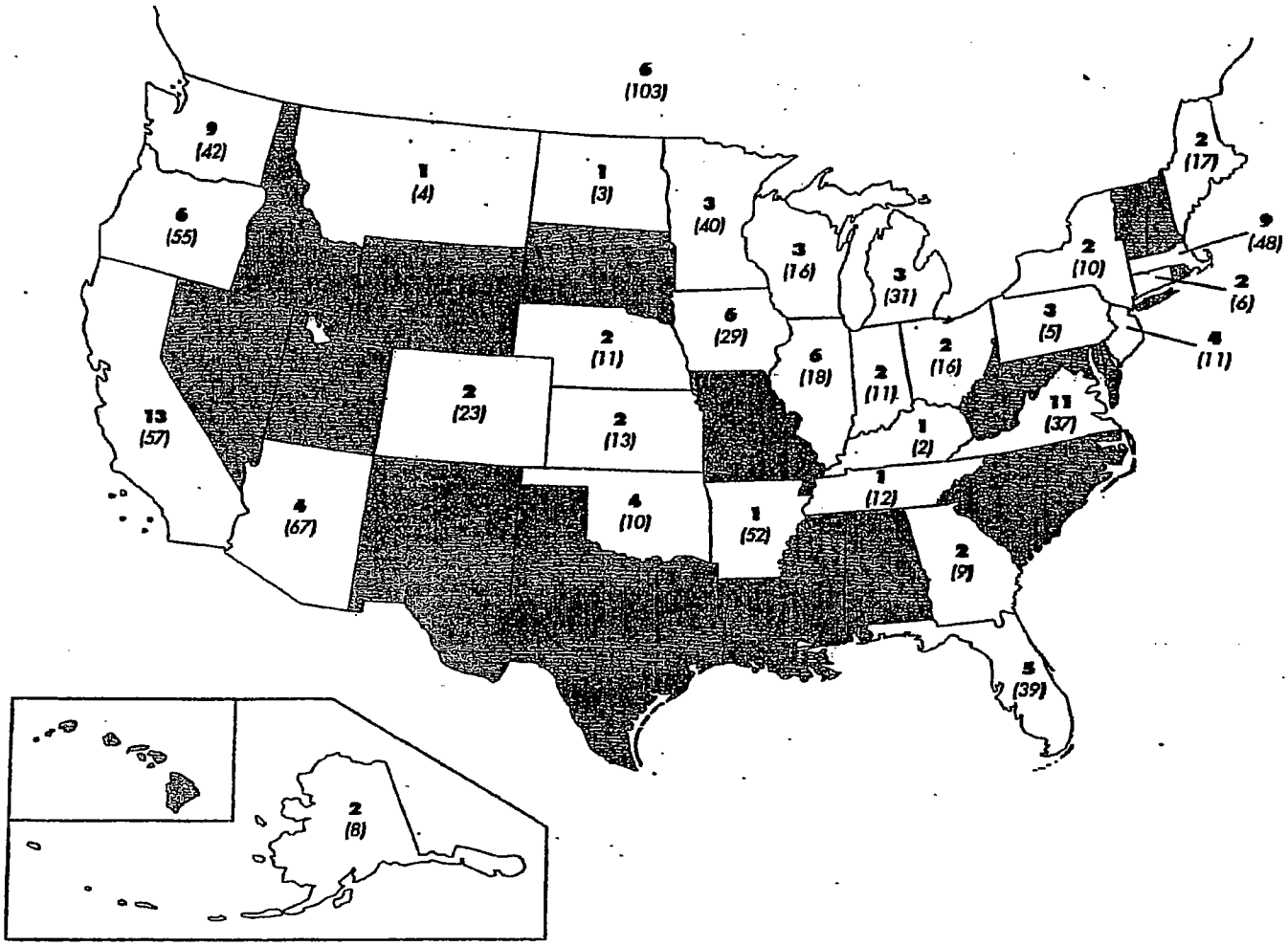

Figure 1. Location of chiropractors and study patients by state. Number of chiropractors is designated in bold, number of patients in parentheses.

randomly selected for quality assurance procedures. Schedule books from the 19 DCs showed a total of 1768 patients, of which 1431 had completed the data collection form (80.9%). For the study period, 18 of the 121 doctors were randomly selected to assess entry of eligible patients into the study for 1 week of the study period selected by the program coordinator. Of a total of 20 eligible in this sample, 8 were entered into the study.

Characteristics of Participating Chiropractors

As shown in Table 1, participating chiropractic practices were predominantly located in suburban areas (38%); only 5% were rural. There were 67 DCs who were the only DC in the practice, either solo practitioners (65) or part of a multidisciplinary clinic.[2] Seven of the practices were multi/interdisciplinary: they included medical physicians (four practices), osteopathic physicians,[2] a dentist,[1] and physical therapists.[1] The multidisciplinary practices also included other complementary healthcare practitioners such as an acupuncturist and massage therapists. Most participating chiropractors (75%) had been in practice more than 5 years. Over 90% of practitioners accept Medicare and private insurance, although fewer accept assignment for direct payment (see Table 1). The majority (74%) of the 121 DCs used more than one spinal adjustive technique, with a mean of two additional techniques (range, 1–8). Activator (46.3%), Diversified (27.3%), and Gonstead (14.0%) were the most

Table 1. Practice and Practitioner Characteristics

Practice Characteristics (n = 96)		Practitioner Characteristics (n = 121)	
Location	**%**	**Accept Insurance Payment**	**%**
Urban	30	Medicare	91
Suburban	38	Accept assignment	78
Small town	27	Medicaid	36
Rural	5	Accept assignment	78
Number of DCs in Practice		Private insurance	93
		Accept assignment	63
1	70		
2	25	**Years in Practice**	
>2	5	<5	25
		5–15	39
		>15	36

DC = doctor of chiropractic.

common primary techniques of 13 reported. The majority (84%) reported recommending vitamin, mineral, and food supplements, and 62% reported making recommendations about specific dietary practices. For the 67 DCs who were the only chiropractor in their practice, the mean number of estimated patient visits per week was 130, median 135. For those DCs whose primary technique was Activator, the mean number of visits was 156, median 135 (range, 16–360). For the others, the mean number of visits was 114, median 105 (range, 20–280).

Cross Section of All Patients

Table 2 shows the demographics and chief complaints of the 8312 patients seeking care during the 1-week cross-sectional data collection period. Most patients (58.6%) were 25–54 years old; 13.3% were 55–64 and 16.3% were over 65. The majority was female in all age groups. Patients were predominantly white (94.6%). Chief complaints were mainly pain-related (60.4%). Overall, 17.0% of patients did not have a complaint but were presenting for maintenance care. Nearly all chief complaints were musculoskeletal, chiefly spinal; of the 6903 nonmaintenance patients, 37.8% had chief complaints related to the back, 16.7% to the neck 3.1% to headache, and 12.5% to the extremities. Multiple locations accounted for 26.3% of chief complaints. Nonmusculoskeletal complaints, such as digestive or breathing problems, accounted for 0.7%; this proportion was highest in the under-25 age group (3.1%). Most complaints were chronic. Furthermore, 39.9% had started more than a year prior; 14.7% were of less than 1 week's duration.

Baseline Characteristics of Study Patients

Demographics

The oldest patient was 98. As shown in Table 3, most were under age 75. Study patients were predominantly females (60.1%), white (94.7%), married (66.3%), high school graduates (54.0%), and retired (68.0%). Among Activator technique practitioners, there was a higher proportion of females (63.9% compared to 56.3% for all other techniques) and of college graduates/postgraduates or professional degrees (26.5% compared to 16.7% for all other techniques).

Body Mass Index and Overweight

Height and weight information was available for 656 (81.5%) of study patients. As shown in Table 3, 38.6% of

Table 2. Demographics and Chief Complaints of Chiropractic Patients by Age Group (n = 8312)*

	Age Group				
	<25	25–54	55–64	65+ (%)	All Ages
Age group	11.7	58.6	13.3	16.3	
Female	58.1	59.6	61.9	64.1	60.4
Race					
White	88.8	91.2	94.9	95.2	94.6
Black	1.9	1.8	1.5	2.4	1.9
Asian/Pacific Islander	1.9	1.5	0.5	0.6	1.3
Hispanic	3.4	2.3	1.0	0.4	1.9
American Indian	1.4	0.8	0.5	0.4	0.8
Other	2.3	1.9	1.1	1.0	1.7
nature of chief complaint					
Pain only	45.0	49.8	47.4	49.3	48.8
Nonpain† only	10.0	16.6	16.1	13.1	15.2
Pain and nonpain†	6.2	11.9	12.9	13.2	11.6
Health maintenance	26.9	15.5	15.7	16.5	17.0
Other	11.2	5.2	6.6	5.4	6.1
Missing	0.7	1.0	1.3	2.3	1.3
Location‡					
Head	5.8	3.5	2.2	0.9	3.1
Neck	20.3	18.3	14.0	4.3	16.7
Back/spine	37.8	38.8	36.8	35.2	37.8
Extremity	10.0	11.3	14.9	16.1	12.5
Nonmusculoskeletal	3.1	0.4	0.5	0.5	0.7
Other	2.5	1.8	1.6	1.9	1.9
Multiple locations	19.7	25.2	29.1	39.6	26.3
Missing	0.8	0.7	0.9	1.5	1.0
Duration‡					
<1 week	21.0	15.7	13.6	8.0	14.7
1–6 weeks	27.3	22.5	21.6	18.1	22.1
6 weeks–1 year	23.7	22.6	21.8	21.2	22.4
>1 year	26.5	38.6	42.2	51.2	39.9

*Numbers are percentages.
†Stiffness and/or numbness.
‡Only nonmaintenance (n = 6903).

Table 3. Demographics and Health Habits of Study Patients by Age Group*

Characteristic	55–64 (n = 311)	65–74 (n = 317)	75–84 (n = 143)	85+ (n = 34)	All Ages (n = 805)
Age group	38.6	39.4	17.8	4.2	100
Female	59.8	59.3	62.2	61.8	60.1
Race					
White	92.9	94.6	98.6	94.1	94.7
Black	1.0	1.0	0.7	2.9	1.0
Asian/Pacific Islander	0.6	1.3	0	0	0.7
Hispanic	1.0	0.3	0	0	0.6
American Indian	1.0	0.3	0.7	0	0.6
Other	2.9	1.3	0	0	1.6
Marital status					
Married	76.2	66.6	51.1	38.2	66.3
Widowed	6.4	21.1	40.6	47.1	20.0
Divorced	12.9	9.5	3.5	11.8	9.8
Single	2.9	2.0	4.9	2.9	2.9
Education (highest level attained)					
Some high school	11.3	12.9	21.0	23.5	14.2
High school graduate	53.7	57.1	49.7	44.2	54.0
College graduate	14.8	13.9	14.7	11.8	14.3
Postgraduate/Professional degree	7.4	7.9	6.9	0	7.2
Technical school	11.3	4.4	4.2	5.9	7.1
Retired from employment	39.6	82.0	92.3	94.1	68.0
Body mass index (BMI)					
Men†	28.0	26.9	25.2	24.7	27.0
Women†	27.0	27.0	26.5	23.7	26.8
Overweight‡	39.8	45.0	37.0	26.9	38.6
Obese§	25.1	18.9	16.8	11.5	20.6
Blood Pressure‖ (mm Hg)	139/82	133/82	138/80	137/80	137/82
Diastolic > 90 mm Hg	14.8	12.0	9.6	18.2	12.9
Hypertension¶	11.3	7.7	21.2	4.6	9.7
Cigarette smoking					
Never	47.6	53.0	55.9	70.6	52.2
Formerly	32.5	33.4	32.2	23.5	32.4
Smoker	17.4	11.1	8.4	2.9	12.7
Alcohol use					
Never	33.4	34.4	47.6	47.1	36.9
Formerly	7.7	10.1	7.0	17.7	8.9
Occasionally	47.0	42.3	34.3	29.4	42.1
Daily	8.7	7.6	3.5	2.9	7.1
Exercise regularly#	49.5	53.6	48.3	32.4	50.2
Follow special diet	34.7	34.7	25.9	8.8	32.1
Vitamins/food supplements	73.6	69.4	68.5	70.6	70.9
Want health habits information					
How to quit smoking**	50.0	25.7	50.0	0	41.2
Vitamins/food supplements	24.4	20.2	20.3	14.7	21.6
Special diets	6.8	8.2	7.0	2.9	7.2
Weight loss	28.6	24.6	16.1	5.9	23.9

*Numbers are percentages unless otherwise specified.
†Mean; n = 656 (81.5%).
‡Defined as BMI 25–30; includes both men and women.
§Defined as BMI >30; includes both men and women.
‖Mean systolic/diastolic; n = 590 (73.3%).
¶Defined as systolic/diastolic >140/90 mm Hg.
#At least 20 minutes at a time, at least three times a week.
**Percentage of smokers. All those but one requesting this information were smokers.

these study patients were overweight and 20.6% were obese, both of which seemed to decrease with age.

Blood Pressure

Blood pressure information was available for 590 patients (73.3%). Of these, 9.7% had hypertension.

Health Habits

As shown in Table 3, 52.2% of patients reported never having been smokers, with prevalence of smoking seeming to decrease with age. Reported daily alcohol use was low in all groups, and also seemed to decrease with age. Overall, 50.2% reported getting regular exercise, with fewer (32.4%) in the 85 and over group. Approximately one-third of the patients reported following a special diet. Use of vitamins and food supplements was reported by 70.9% overall. Patients expressed most interest in receiving information on weight loss programs (23.9%) and vitamins and food supplements (21.6%), and 41.2% of smokers expressed interest in smoking cessation programs.

General Health Status

As shown in Table 4, the SF-12 Physical Component Summary (PCS) scores seemed somewhat lower than the population norms.[30] The Mental Component Summary (MCS) scores differed very little from population norms.

Chief Complaints

Nature and Location

As shown in Table 5, most chief complaints were pain-related; 72.3% were related either to pain only or to pain accompanied by other nonpain symptoms. The back was the single location most commonly cited (32.9%), although 35.5% of patients cited multiple locations (such as "back and leg" or "neck and shoulder"). Complaints that were not pain-related were usually related to stiffness or numbness; 7.5% were for health maintenance and 0.8%[6] were for nonmusculoskeletal complaints. For these six complaints, four involved the digestive system and two the lungs; the ICD-9 codes for all but one were for nonspecific musculoskeletal disorders, such as fascitis or back disorder. DCs listed primary ICD-9 codes that were for nonmusculoskeletal complaints for 1.9%[15] of patients. Because 8 of these 15 diagnoses were for migraines, for which the patients involved had characterized their complaint as headache, the percentage of nonmusculoskeletal ICD-9 codes excluding migraines was 0.9%.[7]

Table 4. Medical Outcomes Study 12-Item Short-Form Health Survey (SF-12) Mean Baseline Scores of Study Patients for Physical Component Summary (PCS) and Mental Component Summary (MCS) by Age Group

	55–64 (n = 236)	65–74 (n = 202)	75+ (n = 118)	Total (n = 556)
PCS (SD)	39.6 (11.5)	40.6 (10.6)	37.4 (10.6)	39.5 (11.0)
Norm[30]	46.6	43.7	38.7	
MCS (SD)	52.7 (9.6)	53.1 (8.9)	50.9 (10.8)	52.5 (9.7)
Norm[30]	50.6	52.1	50.6	

(SD) = standard deviation in parenthesis.

Duration

Most complaints were chronic, with 54.9% having onsets more than 6 weeks prior; 37.2% had onsets more than 1-year prior. For acute complaints, 17.7% had onsets less than 1 week prior and 23.1% had onsets 1–6 weeks prior.

Previous Care for Chief Complaint

Concerning previous care, 341 (45.8%) patients reported that they had seen another provider for their current complaint. Of these, 32.8% (112) had seen only a medical physician (MD), 30.8% (105) had seen multiple providers (usually an MD and another DC), 28.7% (98) had seen only another DC, and 2.9% had seen only a physical therapist[10] or other provider.[10] Combining the number of patients seeing only a chiropractor, either the current DC or a previous one, for 66.6% of patients a chiropractor was the only care provider for their current chief complaint.

Use of Pain Medications

As shown in Table 5, regular aspirin use (more than three times per week) was reported by 20.4% of patients, use of nonaspirin analgesics was reported by 16.9%, and use of prescription pain medications by 14.5%. Overall, 40.6% of study patients reported using at least one medication for pain (prescription or nonprescription) more than three times per week.

PDI

The PDI mean baseline scores increased slightly with longer duration of complaint. The overall PDI mean was 16.3 in those patients with a chronic complaint (>6 weeks), 15.6 in patients with complaints between 1–6 weeks before the baseline visit, and 12.8 with onset less than 1 week. Of the 34 patients 85 years of age and above, all but 4 of those who completed the PDI reported chronic complaints.

As shown in Table 6, 60.9% of patients who had only seen a DC for their chief complaint reported no regular use of pain medications; their mean baseline PDI score was 10.4; 3.9% reported using both nonprescription and prescription medications and this group has a mean PDI baseline score of 23.3. For patients who had seen another provider besides a DC for their chief complaint, 49.0% reported no pain medication use, with a mean baseline PDI of 13.3, and 10.6% reported both prescription and nonprescription medications, with a mean baseline PDI score of 30.5.

Use of X-rays

Overall, 62.1% (500) of patients were X-rayed for their complaint. By age, 57.6% of the 55–64 age group, 63.1% of those aged 65–74 years, 71.3% of those 75–84 years, and 55.9% of those aged 85 years and over were X-rayed. Of the 500 patients who were X-rayed, most X-rays (72.8%) were taken in the participating office; the rest were taken at other chiropractors' offices, MD offices, or radiology clinics.

Source of Payment

As shown in Table 7, the most commonly reported single sources of payment for patients in the study were Medicare (21.9%), cash (19.1%), and private insurance (18.3%).

Table 5. Characteristics of Chief Complaint of Study Patients by Age Group*

	55–64 (n = 311)	65–74 (n = 317)	75–84 (n = 143)	85+ (n = 34)	All Ages (n = 805)
Nature					
Pain only	60.1	56.2	55.9	50.0	57.4
Non pain† only	11.5	11.6	13.3	11.8	11.9
Pain and nonpain†	15.2	14.6	15.4	14.7	14.9
Health maintenance	7.1	7.9	6.3	11.8	7.5
Other	1.6	3.2	2.8	5.9	2.5
Missing	4.5	6.3	7.0	5.9	5.7
Location‡					
Head	2.1	1.0	0.0	0.0	1.2
Neck	10.4	5.8	9.7	10.0	8.5
Back/Spine	35.3	33.0	28.3	30.0	32.9
Shoulder	3.8	2.4	3.0	3.3	3.1
Arm/elbow/hand	2.8	1.7	3.0	3.3	2.4
Hip	3.5	6.8	6.0	13.3	5.6
Knee/ankle/foot	2.1	3.1	3.7	0.0	2.7
Multiple extremity	1.4	3.8	5.2	0.0	3.0
Nonmusculoskeletal	0.7	0.7	0.0	6.7	0.8
Other	0.3	0.7	0.0	0.0	0.4
Multiple locations	34.8	35.9	36.5	33.4	35.5
Missing	2.8	5.1	4.6	0.0	3.9
Duration‡					
<1 week	24.2	14.0	12.7	13.3	17.7
1–6 weeks	22.2	24.3	23.1	20.0	23.1
6 weeks–6 months	9.7	11.3	8.2	16.7	10.3
6 month–1 year	5.5	7.5	9.7	13.3	7.4
>1 year	35.3	37.7	40.3	36.7	37.2
Missing	3.1	5.1	6.0	0.0	4.3
Pain medication use§					
Aspirin	13.8	25.2	23.8	20.6	20.4
Nonaspirin	16.4	17.7	19.6	2.9	16.9
Prescription	13.8	12.0	22.4	11.8	14.5

*Numbers are percentages.
†Stiffness and/or numbness.
‡Only nonmaintenance (n = 745, 289, 292, 134, 30, respectively).
§Use more than three times per week.

However, cash plus another source accounted for 12.6% of payments.

Spinal Adjustments and other Procedures

Type of chiropractic technique used on study patients was reported for 786 patients (97.6%). The most commonly used single techniques were Activator (56.6% of all patients), a procedure using a low-force, high-velocity mechanical force, manually assisted adjusting instrument, and Diversified (23.5%), a procedure using high-velocity, low-amplitude manual force.

In addition to spinal adjustments, the most commonly administered procedures were recommendations for exercising at least 20 minutes three times per week (41.0% of patients), instruction on use of heat or cold applications at home (40.8%), and recommendations on food supplements (24.5%). Other procedures used less often but for more than 10% of patients were ice packs (in the office) (13.5%), ultrasound (12.3%), and hot packs (11.3%). Procedures used for less than 10% but more than 5% of patients were electrical stimulation, massage therapy, corrective exercises, and diet recommendations. Procedures used on fewer than 5% of patients were acupressure, traction, orthotics fitting, recommendation of bed rest, acupuncture, recommendations for weight loss, and homeopathy.

Patient Status at Four-Week Interval of Care

Patient Status

The DCs completed interval-of-care forms at 4 weeks for 799 of the 805 study patients (99.3%). At 4 weeks after the baseline visit, 19.6% (158) of study patients were discharged by the chiropractor, 58.8% (473) continued treatment, and 20.1% (174) had self-discharged (discontinued treatment). DCs in the study reported referring 6.6% of study patients to another provider.

Of the study patients, 585 (73%) completed the study booklet after the 4-week interval of care. Of patients still under care at 4 weeks, 88% completed the booklet; 64% of patients discharged by the doctor and 38% of those who self-discharged completed it.

Treatment Visits

The median number of visits for nonmaintenance patients at discharge was 3 and the mean was 4.1 (range, 1–22;

Table 6. Mean Baseline Pain Disability Index (PDI) Scores of Study Patients by Patient Use of Other Healthcare Providers and Medication Use at Baseline

Healthcare Provider Use for Chief Complaint	Baseline Medication Use*	%	Mean Baseline PDI (SD)
Chiropractor only (n = 409)	None	60.9	10.4 (11.8)
	Nonprescription only	26.9	16.5 (12.7)
	Prescription only	5.6	16.2 (15.9)
	Both nonprescription and prescription	3.9	23.3 (16.7)
Chiropractor plus other provider(s) (n = 359)	None	49.0	13.3 (12.4)
	Nonprescription only	26.2	20.4 (15.9)
	Prescription only	9.5	25.1 (15.4)
	Both nonprescription and prescription	10.6	30.5 (13.9)

(SD) = standard deviation in parenthesis.
*Use more than three times per week.

Table 7. Source of Payment for Chiropractic Services of Study Patients, by Age Group*

Source	55–64 (n = 311)	65–74 (n = 317)	75–84 (n = 143)	85+ (n = 34)	All Ages (n = 805)
Medicare	3.5	31.6	39.9	23.5	21.9
Cash	28.3	17.4	5.6	8.8	19.1
Cash and other source	9.3	14.5	12.6	23.5	12.6
Canadian government plus cash	13.8	11.0	11.9	8.8	12.2
Private insurance	34.7	6.7	7.0	8.8	17.7
Combination of noncash sources	1.6	14.5	14.7	17.7	9.7
Personal injury	2.9	0.3	0.7	0	1.4
Medicaid	0.3	0.3	2.1	2.9	0.8
Workers' compensation	1.0	0.6	0	0	0.6
Missing	3.5	2.8	5.6	5.9	3.7

*Numbers are percentages.

Table 8. Mean Pain Disability Index (PDI) Scores of Study Patients by Patient Status at Four Weeks and Tertile of Baseline PDI Scores*

	Discharged by Doctor (n = 86)		Self-discharged (n = 55)		Continuing treatment (n = 351)	
Baseline PDI	Baseline Mean (SD)	Change Mean (SD)	Baseline Mean (SD)	Change Mean (SD)	Baseline Mean (SD)	Change Mean (SD)
0–5	1.7 (2.0)	−2.0 (5.2)	1.8 (2.0)	−4.3 (7.8)	1.6 (1.7)	−3.8 (8.3)
>5, <15	11.1 (4.1)	0.4 (9.0)	10.4 (3.5)	−0.3 (8.5)	11.7 (4.0)	0.0 (8.3)
15+	33.2 (10.3)	11.6 (18.6)	33.9 (8.7)	5.4 (11.5)	31.6 (9.8)	7.8 (14.9)

(SD) = standard deviation in parenthesis.
*Only nonmaintenance patients with 4-week interval data.

n = 137). For patients who discontinued treatment by 4 weeks the median was 3 visits and the mean was 4.2 (range, 1–21; n = 134). For patients who were continuing treatment the median was 7 and the mean was 6.9 (range, 1–22; n = 385).

PDI

Table 8 shows the PDI mean scores at baseline and the mean change from baseline at 4 weeks. For all three patient status groups, the tertile with the highest PDI mean baseline score showed the most change at 4 weeks; for the patients discharged by the doctor, the PDI mean change was 11.6 points lower at 4 weeks, for continuing patients it was 7.8 points lower, and for self-discharged patients it was 5.4 points lower. Each of these groups had a PDI mean baseline score greater than 30 points. In the lowest tertile, with PDI mean baseline scores less than 5, the 4-week PDI mean score was higher than the baseline in all three groups. The middle

tertile group had PDI mean baseline scores of less than 12 and showed almost no change between baseline and 4 weeks.

Pain Medication Use

As shown in Table 9, for patients who were discharged by the doctor, the proportion of reported pain medication (prescription or nonprescription) use decreased by 7.3% from baseline to 4 weeks, increased for patients who discontinued care (self-discharged), and remained about the same for those continuing care.

DISCUSSION

There were several limitations of the study inherent to practice-based research. First, PBR is usually conducted among volunteers, who may not be typical of the general population of practitioners.[10–15] However, our participating DCs seem to be representative of US DCs in most respects.[6–8] The chief differences between our study's participants and US DCs in general was choice of primary adjustive techniques—although the three most commonly used techniques in this study are all used by over 50% of US chiropractors—and a higher patient volume.[6,8] This is due to the participation of DCs using Activator technique, the only professional organization responding to our recruitment efforts, perhaps because this organization emphasizes the importance of research. Although DCs using this technique are overrepresented in the study, characteristics of their patients did not differ substantially from those of US chiropractic patients, except for a higher proportion of females and college graduates.[7] The higher proportion of more highly educated female patients may have biased our results, as they may have had a greater interest in taking care of their health.[6,8]

A second limitation of PBR is the difficulty in supervising data collection in distant participating offices. In particular, it was not possible to verify eligibility except in terms of age of study patients; we could not verify that all eligible patients were included, nor that all study patients were in fact eligible, by the study's definition. Our quality assurance procedure indicated that, in the random sample assessed, about 80% of all patients were included in the cross section of all patients, but fewer than half of eligible patients were included in the study of patients aged 55 and over. Because few data have been published on this aspect of PBR, there is no standard against which to compare these findings; however, clearly this presents a definite limitation to the representativeness of PBR samples, because we have little information about those patients who did not enroll in the study. Judging from feedback from the doctors, it is likely that a small number of patients with greater disability and pain were not included because of anticipated difficulty completing the forms. Thus some degree of bias toward healthier patients may be present.

A third limitation of PBR is the frequent dependence on self-report data. Self-report responses may reflect inherent biases or misunderstanding of questions. Use of valid, reliable instruments like the PDI and SF-12 is important in minimizing bias.[31] Comparison of doctor- and patient-reported responses, such as the ICD-9 code and chief complaint, showed a slight disparity between patients' and doctors' designation of a chief complaint as nonmusculoskeletal, although it is most likely negligible because both patients and doctors reported fewer than 1% of chief complaints as such, and this figure is nearly identical to that reported in a large study of chiropractic practice conducted through actual record reviews.[7] Comparison to actual patient files for a sample of patients would be desirable in future studies to make a better assessment of possible self-report bias, particularly for older patients who are often taking a number of medications. Although use of pain medication would seem to be a valuable outcome measure for chiropractic care, future studies will need to provide a more explicit methodology for recording it, which was beyond the scope of the present study.

Chiropractic patients in this study are similar demographically to patients of primary care medical physicians in most respects except race; ethnic minorities are underrepresented among chiropractic patients, which is typical of chiropractic practice in general.[32–34] In terms of chief complaint, chiropractic patients differ dramatically from primary care medical patients. Musculoskeletal complaints composed nearly the entire case load of the chiropractors in this study, consistent with other chiropractic studies,[6–8] whereas sprains, strains, and degenerative joint disease accounted for 5.6% of primary care medical visits.[35] In keeping with this musculoskeletal focus, chiropractors in our study provided less dietary counseling (5–10% of study patients) than exercise counseling (40%); they took blood pressures for 73% of study patients. For comparison, primary care medical physicians provided dietary counseling to 18% of adult patients in 1992,[35] and exercise counseling to 30% of sedentary patients, according to a 1988 study;[36,37] 81.9% of all adult patients had blood pressures taken.[35]

There has been some question about whether chiropractic serves as a substitute for or a supplement to medical care.[2,38,39] From our data, perhaps the answer is a qualified, "both." Many patients seek *only* chiropractic care for complaints related to mild-to-moderate musculoskeletal pain (66.6% of patients in this study), whereas patients with more severe symptoms seem to use both medical and chiropractic care. However, one cannot infer from this that the chiropractors in this study are substituting for medical caregivers except in the area of musculoskeletal pain; the virtual exclusion of nonmusculoskeletal complaints among either the 805 study patients or 8312 patients of all ages indicates that this is likely not the case.

The results of the study provide some information on use of the PDI in a population of relatively healthy older adults visiting chiropractors. Clearly, the patients in this study had comparatively mild pain-related disability compared to medical patients in other studies using the PDI; the PDI mean baseline score for our patients with chronic complaints was 16.3 compared to 37.4 in a study of rheumatoid arthritis

Table 9. Percentage of Study Patients Regularly Using Pain Medication by Patient Status at Four Weeks*

Regular Pain Medication Use†	Discharged by Doctor (n = 96)	Self-discharged (n = 59)	Continuing Treatment (n = 378)
Only at baseline	12.5	8.5	11.6
Only at 4 weeks	5.2	20.3	10.3
At both baseline and 4 weeks	21.9	27.1	30.4

*Only nonmaintenance patients with 4-week interval data.
†Use more than three times per week.

patients, and 49.9 for patients in a study of use of fentanyl for low back pain.[25,28] It is actually more similar to the mean score of outpatients after a course of treatment (18.5) described by Tait et al.[22] In the only other study of chiropractic patients using the PDI, for 18 women with chronic pelvic pain the PDI mean score was 18.7.[29] Patients in the highest tertile for PDI mean baseline scores showed similar changes in the PDI at 4 weeks to patients in the medical studies cited above.[25,28] However, we still need more information on the clinical meaning of such changes in the PDI to determine its use as an outcome measure. In viewing the changes between baseline and 4 weeks by tertile for the baseline mean scores, it seems that a regression-to-the-mean effect may be occurring. It is also interesting to note that in the group of patients who voluntarily discontinued treatment, the lowest tertile disability scores increased more and the highest tertile scores decreased less than in the other patient status groups. In terms of the possible utility of the PDI as an outcome assessment, it would seem from our results that scores on the PDI taken after an interval of treatment are highly correlated to the patient's baseline score; that is, patients with lower levels of disability at baseline show less change in the PDI after an interval of treatment than do those with higher levels of disability. Consequently, it would seem that, for an outcome assessment instrument, the PDI may be most useful for patients with higher initial disability scores. It may not be responsive to typical chiropractic patients' complaints, which, even though they seem chronic, may be more episodic with chronic recurrences, and may be associated with lower levels of disability. Future studies would need to acquire more detailed information on this aspect of the chief complaint to determine the utility of the PDI as an outcome measure.

In the few published articles on the topic, it is not clear whether older chiropractic patients are of higher or lower health status than the general population. In 1980, Yesalis et al. in rural Iowa found that chiropractic use was associated with poor health status.[38] Cherkin and MacCornack found that chiropractic low back pain patients had more episodes of pain and greater chronicity than family practice medicine low back pain patients,[40] whereas Hurwitz et al. in 1997 found that patients with comorbidities and more severe symptoms were less likely to use chiropractic.[41] In a small study of 285 older patients in California, chiropractic users reported higher health status and more strenuous exercise, but there were no significant differences in smoking, alcohol consumption, or regular exercise.[9]

Comparing our sample of patients to the general US population, these chiropractic patients seem to be somewhat healthier in several respects. In terms of obesity, 72.0% of white American men and 62.0% of white American women aged 60–69 years are overweight or obese, compared to 52.4% of our sample aged 65–74 years; 65.0% of white men and 56.0% of white women aged 70–79 years are overweight or obese, compared to 44.8% of our sample aged 75–84 years.[42] Concerning hypertension, 42.9% of American men and 57.3% of women aged 55–64 years, 57.3% of men and 60.8% of women aged 65–74 years, and 64.3% of men and 77.3% of women aged 75 years and over have hypertension.[42] For the 73.3% who had blood pressure readings available in our sample, with men and women combined, 11.3% aged 55–64 years, 7.7% aged 65–74 years, 21.2% aged 75–84 years, and 4.6% aged 85 years and over had hypertension. Of course, this finding may indicate that many of the study patients are having their hypertension managed medically—which would suggest that they are concerned with their health. In respect to smoking, 25.5% of Americans aged 45–64 years currently smoke and 13% of those aged 65 years and over smoke. In our sample, smoking seems to be less common, with 12.7% aged 55 years and over and 9.7% of patients aged 65 years and over reporting being current smokers. In respect to physical activity, 20.6% of American men and 16.5% of women aged 65–74 years and 20.6% of men and 12.8% of women aged 75 years and over get at least 20 minutes of exercise three times a week[43]; 50.2% of our sample aged 55 years and over reported that they got this amount of exercise, although our finding may represent an overestimation due to self-report. Although our sample may be biased toward healthier older adults, and so our results may not be completely generalizable to chiropractic practice in general, they still provide some support for the theory that older adults who are interested in their health are more likely to seek chiropractic care.

Use of pain medication, an important consideration, seems to have decreased after 4 weeks of care among the group of patients who were discharged by the doctor, but not among those who self-discharged or who were continuing care. Because of the limitations due to self-report, to the small subgroup size, and to attrition at 4 weeks, this finding can only be considered an interesting avenue for possible future exploration.

It seems that a significant proportion of chiropractic patients self-select for chiropractic care only; from our results, it seems that these are patients with mild pain and disability, over half of whom (61%) report taking no pain medications. Inasmuch as it seems that many older adults are seeking chiropractic care for relief of musculoskeletal problems, probably in addition to medical care for other health concerns, the descriptive information in this study may assist providers of care to better understand their patients' use of chiropractic care.

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With the population aged 65 and older expected to double between 2011 and 2030, the health care needs that will be created by this rapid population increase will place great demands on the country's already-challenged health care system.[1] The elderly tend to suffer from chronic conditions, and often have many health problems that increase the complexity of their medical. Much of the elder population suffer from musculoskeletal conditions, such as nonspecific back and joint pain and osteoarthritis, all of which are common causes of disability and decreased function in the elderly.[2]

CHIROPRACTIC, A PROFESSION APART

Chiropractic is a profession apart. After acquiring three or more years of undergraduate education, doctors of chiropractic are trained in private professional institutions, most having little interaction with other health professionals. Therefore, among health professionals, little is known of the depth and breadth of chiropractic training, role and scope of practice.

The term "chiropractic", coined by the profession's founder D.D. Palmer, means "hands on healing". Chiropractic is known for its hands-on approach to health care, with the chiropractic adjustment (sometimes referred to as spinal manipulative treatment) at its core (1, 2, 3). Chiropractic is a health care discipline that emphasizes the inherent recuperative powers of the body to heal itself without the use of drugs or surgery. The practice of chiropractic focuses on the relationship between structure (primarily the spine) and function (as coordinated by the nervous system) and how that relationship affects the preservation and restoration of health. In addition, doctors of chiropractic recognize the value and responsibility of working in cooperation with other health care practitioners when in the best interest of the patient (4).

All accredited chiropractic college curricula must include at least one course with a focus on the health care needs of the geriatric population (5). The typical course in geriatrics or gerontology at a chiropractic college involves an estimated 30 hours of classroom time (6, 7).

USE OF CHIROPRACTIC HEALTH SERVICES

Over the past decade, interest in complementary and alternative medicine (CAM) in healthcare has increased with significant increases in public demand for CAM services (8). Americans' out-of-pocket expenditures on CAM health services were an estimated $22 billion in 1997 (8). Chiropractic is, by far, the largest "alternative" health care profession, and in a recent comprehensive government survey two-thirds of all patients who sought care from a licensed CAM provider visited a doctor of chiropractic (8-12).

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1. U.S. Census Bureau 2004.
2. AGS Panel. The management of chronic pain in older persons. J Am Geriatric Soc 1998; 46(5): 635-51.

Even though most chiropractic patients *initially* seek care with a complaint of back pain, many *established* chiropractic patients continue to see their chiropractor for wellness or preventive-type care (13, 14). Patients of chiropractic usually see both a doctor of chiropractic and another health care provider concurrently, but for different conditions (14). The 1994 Agency for Health Care Policy and Research guidelines for acute low back pain recommended chiropractic manipulative treatment as one of the most useful, evidence-based interventions for adults with low back pain (15). Since musculoskeletal complaints are extremely common later in life, the numbers of geriatric chiropractic visits are destined to rise in congruence with recent trends in population demographics and CAM use.

DOCTORS OF CHIROPRACTIC AND INTERDISCIPLINARY TEAMS

Multidisciplinary teams have become a hallmark of many elder health programs, reflecting the growing consensus that no single discipline has all of the resources or expertise needed to appropriately care for the elderly and their health needs.

In 1994, the US government funded a study of the role of doctors of chiropractic in interdisciplinary healthcare, particularly in rural, underserved areas (16, 17). Before this time, little was known of the chiropractor's role in interdisciplinary healthcare, and even less was published on this topic. Since that time, the chiropractic presence on interdisciplinary teams appears to be increasing. Through US Health Resources and Services Administration funding, several projects have been undertaken to increase awareness among doctors of chiropractic regarding interdisciplinary issues and incorporate interdisciplinary elements into chiropractic educational models (17-25).

Chiropractic care is an active care model that is multi-factorial, in that it may incorporate prevention, exercise, health and wellness promotion along with the alleviation of pain (condition-based care). But, chiropractic is not the entire picture in geriatric health care. For some time now, the health care needs of the elderly have been looked after, in parallel, by a variety of practitioners. Older patients instinctively seek the care of multiple health care providers. They may see a medical doctor for periodic check-ups and for medications, a pharmacist to dispense their medications, a dentist for their teeth, a podiatrist for their feet, a chiropractor for their back, and a nurse for general assistance at home.

Much of the development of frailty can be delayed with an integrated approach to health care, with a focus on prevention. Exercises and healthful activities of daily living, as recommended by doctors of chiropractic and other health professionals, have been shown to improve functional status, decrease depression, prevent heart disease, decrease arthritic pain and improve function in persons with osteoarthritis. Maintenance of good nutrition in older persons is also a key element of a healthy lifespan and is typically recommended by doctors of chiropractic. The use of certain nutritional supplements may decrease coronary artery disease and numerous other health concerns. Chiropractic treatments, as we have observed in practice, can provide dramatic positive results as well in our older patients. All members of geriatric health care teams have an important role to play. However, if providers all independently contribute a piece to geriatric healthcare, without communicating across disciplinary lines, a great opportunity for the enhancement and efficiency of that care is lost. (26)

Older patients are often our most complex patients, possessing multiple musculoskeletal and systemic complaints, and they frequently rely on numerous medications. Given such complexity, providers should, ideally, be open to collaboration for the overall good of the patient. As our society ages, increased use of complementary and alternative healthcare services (including chiropractic), and an increase in the inclusion of doctors of chiropractic on interdisciplinary geriatric healthcare teams is almost certain. (26)

PAIN: A CLOSER LOOK

It is estimated that one-third of the population in economically developed countries suffers from chronic pain, and that spinal pain affects up to 80% of the U.S. population at some point in their lifetime (27). It has been reported that chronic pain may be more prevalent in the elderly population (28, 29, 30). About 20-50% of the elderly population living within the community suffers from pain. Statistics indicate that chronic pain in the elderly is an area of growing clinical need (28). Unfortunately, the high prevalence of chronic conditions and chronic pain in the elderly does not correspond with the proportion of elderly receiving treatment (31). Chronic pain in the elderly also may lead to depression, social isolation, functional decline and disability. In older pain patients, there is also associated morbidity and mortality from urinary and fecal incontinence, falls and pressure ulcers (32).

MAKING THE CASE FOR INTEGRATED CARE

Chronic pain is a multidimensional experience with sensory, affective and cognitive-evaluative components, each of which interacts with and contributes to the final pain response. The assessment and treatment of pain in the elderly, therefore, requires a holistic approach with sensitivity to the special concerns of this population (31).

Up to 50% of the community dwelling elderly and 80% of institutionalized elderly suffer from chronic pain and a large proportion of these individuals do not receive any form of pain treatment (31,32). This problem has only been exacerbated by the fact that the elderly have been systematically excluded from multidisciplinary pain rehabilitation programs that are known to be clinically effective (33).

The main reasons for the increased use of CAM are for chronic conditions and pain management. Chiropractic care was classified as one type of CAM (34). According to Astin in his 1998 JAMA article, anxiety, back problems and chronic pain were the most common health problems for which alternative care was sought (35).

The goals of multi-faceted (integrated) approaches to chronic pain programs are to:

1. Minimize pain;
2. Increase physical function;
3. Improve psychological well-being;
4. Reduce reliance on health care providers; and
5. Reduce reliance on pain-related medications. (33)

Such multidisciplinary chronic pain programs have a documented history of clinical efficacy (33). A meta-analysis of the efficacy of multidisciplinary pain treatment centers revealed that sample groups receiving multimodal treatment for chronic pain are superior to no-treatment, waiting list, and single-discipline treatments such as medical treatment or physical therapy. The geriatric population benefits from multidisciplinary chronic pain rehabilitation programs comparably or greater than younger chronic pain patients, even with initially greater clinical impairment (36, 37).

ROLE FOR CHIROPRACTIC CARE IN THE AGING AND RURAL POPULATIONS

Chiropractic is the most commonly used form of provider-delivered complementary health care, with 11% of American adults seeking care annually (8). Currently, more than 30% of patients with low back pain seek chiropractic care and 17% of chiropractic patients are over age 65 (11,12,38). At this rate, based on 2004 US Census figures, nearly half of all chiropractic patients will be over age 65 with the approach of the baby boomers reaching old age. Although, use of chiropractic varies by region, some studies have found it to be more frequently used in rural medically underserved areas, where there is often a shortage of health care professionals to care elderly needs.

Most often, especially among the elderly, patients will utilize chiropractic care for health conditions that other medical providers do not address (14, 39). Well over 90% of chiropractic patients' chief complaints are musculoskeletal, usually spine-related back pain, neck pain and headache, with osteoarthritis one of the more common conditions seen by doctors of chiropractic (40,41,42). Since chronic pain (usually musculoskeletal in nature) is one of the most common factors affecting function in older people, chiropractic care is highly relevant to any investigation of health status of the elderly. In fact, the 1998 guidelines on the management of chronic pain in older persons, developed by the American Geriatrics Society (AGS) panel, listed chiropractic care among the non-pharmacologic strategies for pain management, which carries few adverse effects (43). However, it should be noted that the AGS panel listed only one citation to support its recommendation pertaining to chiropractic, an Iowa study of the rural elderly published in 1985 (43). Today there are other studies that support the panel's findings.

CHIROPRACTIC RESEARCH ON AGING AND GERIATRIC CARE

While few chiropractic research efforts have focused on the care of aging patients, the practice-based studies summarize a few key points about chiropractic and geriatrics: 1. The vast majority of geriatric patients under chiropractic care are receiving health promotion and prevention recommendations about physical activities, nutrition and injury prevention (13,14); and 2. The patients who received chiropractic care in addition to traditional medical services in the long-term care setting had fewer hospitalizations and used fewer medications than patients receiving medical care only (44).

CHIROPRACTIC CARE FOR AGING PATIENTS

In clinical decision-making regarding the chiropractic care of aging patients, health status is more important than chronological age. Since geriatric patients come into chiropractic and medical practices with widely ranging levels of bone density, frailty and overall health status, it would be inappropriate to adopt a "one size fits all" care protocol for geriatric care. Fortunately, there is a wide range of chiropractic approaches, and some could be perceived as more suitable for certain patients and specific scenarios (45-48). While chiropractic is sometimes associated with the 'popping' or 'cavitation' of the spinal joints, numerous conservative management procedures including low force and soft tissue techniques have been developed within chiropractic as gentler alternatives. Many of these procedures offer potentially suitable options for older or frailer patients in need of chiropractic care (46, 48, 49).

CONCLUSIONS: CLINICAL CHIROPRACTIC GERIATRIC PRACTICE

Doctors of chiropractic are well positioned to play an important role in health promotion, injury/disease prevention, and on geriatric care teams due to their conservative patient centered practice style and holistic philosophy. The bottom line in aging care is that *someone* in the health care area *must* provide health promotion/preventive services to older patients before the baby-boom generation profoundly overwhelms our health care system. Chiropractic services are safe, effective, low cost and receive high rates of patient satisfaction (1, 10, 11, 50-52). In the managed care environment, time pressures on allopathic providers may preclude them from spending sufficient time discussing health promotion and prevention with their patients. Chiropractic care is based on an active care model. Along with the hands-on nature of chiropractic care, a strong doctor-patient relationship is forged in which health and lifestyle recommendations may be comfortably and effectively discussed.

Relative to musculoskeletal care in elderly patients, chiropractic adjustments (spinal manipulative treatment) are recommended by the Agency for Health Care Policy and Research (15) for the care of acute low back pain, and the American Geriatric Society Panel Guidelines for the Management of Chronic Pain state that non-pharmaceutical interventions such as chiropractic may be appropriate (43). Most geriatric health care providers have a limited number of options to offer patients with these complaints. Various chiropractic procedures are available as safe alternatives to drugs and surgery for musculoskeletal complaints in the older patient. Due to the prevalence of these conditions in older patients, and the success of chiropractic in caring for these patients, interdisciplinary geriatric health care teams should include a doctor of chiropractic to better facilitate a more active, healthy, aging society.

Doctors of chiropractic, who are heavily trained in health assessments, diagnosis, radiographic studies, health promotion and prevention, are excellent candidates to provide many primary health care services to aging patients. This is particularly important to a nation that is straining to provide adequate geriatric healthcare in rural areas and those areas with medical provider shortages. (53-54).

Continued improvements in geriatric education, and an increase in research and publication on chiropractic care of the aging patient are essential. As stated by Montes and Johnston in the Journal of Health Education,

> "Training, as well as continual upgrading of the competencies for health educators, must include ways of dealing with the great disparities in health among populations, especially those most vulnerable and underserved. Faculty too must be prepared in …this ever-changing health care delivery system." (55)

In a rapidly aging society, doctors of chiropractic, (along with other health professionals) are well suited to provide optimal health care to this important segment of our society and assist them in maintaining active, quality-based lifestyles.

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Utilization, Cost, and Effects of

Chiropractic Care on Medicare Program Costs

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Executive Summary

This study examines the utilization, cost, and effects of Chiropractic services on Medicare program costs. In the course of this investigation, service utilization and program payments for Medicare beneficiaries who were treated by Doctors of Chiropractic are compared with similar data for beneficiaries treated by other provider types. The results strongly suggest that Chiropractic care significantly reduces per beneficiary costs to the Medicare program. The results also suggest that Chiropractic services could play a role in reducing costs of Medicare reform and/or a new prescription drug benefit. Presented below are detailed findings from our investigation.

What data and methods were used to investigate utilization, cost, and the effects of Chiropractic services on Medicare program costs?

To investigate utilization, cost and the effects of Chiropractic services on Medicare program costs, data were compiled from the Centers for Medicare and Medicaid Services' (CMS) 1999 5 Percent Standard Analytical Files. A data extract was created that identified all Medicare beneficiaries with primary diagnoses of selected musculoskeletal, dislocations, and sprains and strains of joints and adjacent muscles conditions during 1999. The beneficiaries were divided into two groups: (1) those who were treated by Doctors of Chiropractic and (2) those who were not. Service utilization and payment data for the two groups of beneficiaries were analyzed and compared.

How many beneficiaries had a Medicare claim with a primary diagnosis of any of the selected medical conditions during 1999?

During 1999, approximately 5.8 million beneficiaries had a Medicare claim with a principal diagnosis of at least one of the selected medical conditions. Of these individuals, about 1.5 million (26.8 percent) received Chiropractic care and 4.3 million (73.2 percent) were treated by other provider types.

Do global patterns of utilization and costs for all Medicare services differ between beneficiaries who did/did not receive Chiropractic care?

Yes, there was a consistent pattern of differences in service utilization and Medicare payments for beneficiaries who saw Doctors of Chiropractic versus those who did not.

- Beneficiaries who received Chiropractic care averaged fewer Medicare claims

per capita than those who did not (33.4 claims versus 38.5 claims).

- Beneficiaries who received Chiropractic care had lower average Medicare payments for all Medicare services than those who did not ($4,426 versus $8,103).

- Beneficiaries who received Chiropractic care had lower average Medicare payments per claim than those who did not ($133 versus $210).

- Beneficiaries who received Chiropractic care had lower average costs for each type of claim during 1999 than those who did not.

Do patterns of utilization and costs for just the selected musculoskeletal and related medical conditions differ between beneficiaries who did/did not receive Chiropractic services?

Yes, the 26.8 percent of Medicare beneficiaries with the selected medical conditions who received Chiropractic care generated nearly twice as many claims per capita for these conditions but only 19 percent of the total Medicare payments for their treatment.

- Beneficiaries who received Chiropractic care averaged more claims per capita than those who did not (8.0 versus 4.0).

- Beneficiaries who received Chiropractic care had lower average Medicare payments per capita for the treatment of these conditions than those who did not ($380 versus $594).

- Beneficiaries who received Chiropractic care had lower average Medicare payments per claim than those who did not ($48 versus $149).

Do beneficiaries who did/did not receive Chiropractic care have different patterns in their subsequent utilization of Medicare services?

Yes, there are distinct differences between the two groups of beneficiaries in their subsequent use of Medicare services.

- During 1999, the majority of beneficiaries in both groups had subsequent encounters with the Medicare program, following their initial encounter for a primary diagnosis of any of the selected musculoskeletal and related conditions. However, a lower proportion of beneficiaries who received Chiropractic care had a second encounter (69 percent versus 80 percent) or a third encounter (66 percent versus 73 percent) compared those who did not receive Chiropractic

services.

- Overall, a much lower proportion of both groups had a second or third encounter with the Medicare system for the treatment of the selected medical conditions. However, beneficiaries receiving Chiropractic care were less likely to have a second encounter (14 percent versus 34 percent) or a third encounter (11 percent versus 20 percent) than those who did not receive Chiropractic services.

Do gender differences explain the variations in service utilization and payments for these two groups of Medicare beneficiaries?

While gender differences on the order of about 5 percentage points exist between the two groups of beneficiaries, gender, by itself, does not appear to provide an explanation for the service utilization and payment variations.

Do differences in the age distributions of the two groups of beneficiaries explain the variations in service utilization and payments?

There are differences in the age distributions between the two groups of beneficiaries. A smaller proportion of beneficiaries under 65 years of age and over 80 years of age were likely to receive Chiropractic services. However, age, in this instance, appears to be a surrogate for medical acuity.

If one controls for acuity by deleting beneficiaries with institutionalized (i.e., hospital inpatient, SNF, and/or hospice) claims during 1999, do differences in utilization and costs between the two groups of beneficiaries still exist?

After removing beneficiaries with institutional claims during 1999, substantial differences still exist between the two groups of beneficiaries. Beneficiaries who received Chiropractic care still had lower overall payments per capita and per claim for all Medicare services and for their lower back pain care than those who did not.

What roles could Doctors of Chiropractic play in Medicare reform and/or a new prescription drug benefit for the elderly?

The findings of our current law analysis strongly suggest that decreased access to Chiropractic services would increase program costs. Attention should, therefore, be paid to access to Chiropractic services during the reform debate. Similarly, our analysis found that, overall, those beneficiaries who used Chiropractic services, have lower Medical doctor costs. Hence, some savings would probably accrue to the Medicare program if access to Chiropractic services were increased in concert with a Medicare prescription drug benefit.

In conclusion, these results strongly suggest that Chiropractic care significantly reduces per beneficiary costs to the Medicare program currently and could potentially save even more in the future.

Introduction

The purpose of this study is to examine current cost savings associated with the provision of Chiropractic services in the Medicare program and to speculate on future potential savings. A primary obstacle to comprehensive coverage of Chiropractic services in the Medicare program has been the persistent perception by policy makers that such coverage would increase Medicare expenditures. For example, several years ago, one since departed CBO analyst placed an enormous price tag on a modest expansion of Chiropractic coverage. The supporting research that led up to these estimates was heavy on assumptions and light on facts. A formal investigation of the use and costs of Chiropractic services in the Medicare population is, therefore, warranted.

To analyze the cost savings associated with the provision of Chiropractic care in the Medicare program, we examined service utilization and program payments for Medicare beneficiaries with selected medical conditions who were treated by Doctors of Chiropractic and compared them with similar data for beneficiaries who was treated by other provider types. The remainder of this paper is divided into 4 sections. We begin by describing the data sources and methodology used to conduct our analyses. Next, we compare the service utilization patterns and costs of beneficiaries receiving Chiropractic care with those receiving care from other providers. For each group we investigate differences in their total use and costs of health care services and in their use and costs of service for the selected medical conditions. After that, we examine the demographic characteristics (i.e., gender and age) of each group of beneficiaries and attempt to explain the differences between Medicare beneficiaries who received Chiropractic care and those who did not. The final section speculates on potential savings that could accrue under Medicare reform or the addition of a prescription drug benefit to the program.

Background

This study builds on extensive research conducted by the Department of Defense (DOD). DOD conducted a multi-year and multi-site demonstration of Chiropractic services.[3] Both a DOD contractor and Muse & Associates evaluated the results of the demonstration and found that, relative to non-users, users of Chiropractic services had:

Better health outcomes;

- Higher satisfaction; and
- Lower costs.

[3] *Report on the Department of Defense Chiropractic Demonstration Program*, Prepared by the Chiropractic members of the Oversight Advisory Committee in collaboration with Muse & Associates, March 3, 2000. Also, *Chiropractic Health Care Demonstration Program: Final Report*, Birth and Davis, Inc., February 2000.

A section of that report looked at the elderly. This study builds on that research and focuses primarily on the elderly.

Data Sources and Methodology

The data used in this study were compiled from the Centers for Medicare and Medicaid Services' (CMS) 1999 Standard Analytical Public Use Files (SAF). These files, which contain final action claims data with all adjustments resolved, capture 98 percent of all claims for all Medicare beneficiaries in a given year. The 5 Percent SAF, the data source used in this study, is created by selecting all claims records for beneficiaries with values 05, 20, 45, 70, or 95 in positions 8 and 9 of the Health Insurance Claim number.

The 5 Percent SAF consists of 7 separate files. These include inpatient, skilled nursing facility (SNF), outpatient, hospice, durable medical equipment (DME), home health agency, and Part B physician/suppliers. Results from all analyses of these files can be extrapolated to the entire Medicare population.

To conduct our analyses, we completed the following tasks:

1. From the 1999 SAF, we created a data extract that:

    - Identified all Medicare beneficiaries with primary diagnosis of selected musculoskeletal and related medical conditions;[4]

    - Pulled all of the claims for each of the beneficiaries identified.

2. From the initial extract, we created a research file that:

    - Divided the beneficiaries into two groups: (1) those who were treated by Doctors of Chiropractic and (2) those who were not. Beneficiaries who were treated by both Doctors of Chiropractic and other providers were placed in the Chiropractic care group.;

    - Created sub-files for each group of beneficiaries for the selected medical diagnoses only;

    - Provided service utilization and payment data for the treatment of beneficiaries with these selected primary diagnoses in the Medicare population.

Scope of Chiropractic Services

There is a misconception that Doctors of Chiropractic only treat low back pain. Although Doctors of Chiropractic have experience in treating back pain, they are trained and educated to treat a range of neuromusculoskeletal conditions and related ailments that affect the entire body.

[4] The selected categories included ICD-9 diagnostic codes 720.xx, 721.xx, 722.xx, 723.xx, 724.xx, 739.xx, 839.xx, 846.xx, and 847.xx. While these ICD-9 codes are the ones typically seen in Chiropractic practice, there is great variability in the use of these codes by Doctors of Chiropractic and other providers.

According to Chapman,[5] various studies, which include national surveys in the U.S., Canada, Australia, and Europe, indicate that 95 percent of Chiropractic patients have neuromusculoskeletal pain/neuromusculoskeletal disorders.

Chapman states that in treating neuromusculoskeletal pains and disorder, Doctors of Chiropractic may encounter non-musculoskeletal complaints. Whatever the patient's condition, Doctors of Chiropractic fundamentally see themselves as diagnosing and treating the underlying joint and soft tissue dysfunction. This will have reflex effects in the nervous system that may influence various conditions and general health, not just the patient's primary neuromusculoskeletal complaint.

Appendix A provides a list of the diagnoses codes commonly treated by Doctors of Chiropractic. The list, while not exhaustive or all-inclusive, includes diagnoses codes for diseases of the nervous system and sense organs, including migraines, diseases of the musculoskeletal system and corrective tissues, congenital abnormalities, and injuries, including sprains and strains.

Analysis

Baseline Summary

The analysis begins with an examination of the baseline summary of all claims for all services for Medicare beneficiaries with the selected primary diagnoses. Baseline summary data are presented in Table 1.

In 1999, there were over 5.8 million out of a total of approximately 39 million Medicare beneficiaries, nearly 15 percent of all beneficiaries, with at least one medical claim with a principal diagnosis included in the group of selected medical conditions. Collectively, these individuals generated 216 million medical claims and Medicare program payments in excess of $41 billion. On a per capita basis, program payments per beneficiary equaled $7,117. Payments per claim averaged $191.49.

As shown in Table 1, nearly every beneficiary generated a Part B professional claim and over 80 percent used outpatient services. Additionally, approximately 30 percent (29.2 percent) of the beneficiaries had DME claims and 28.4 percent had an inpatient hospitalization. Significantly lower proportions of these beneficiaries used home health services, had a nursing home stay, or needed hospice care.

[5]Chapman-Smith, David. *The Chiropractic Profession,* West Des Moines, IA: NCMIC Group, Inc., 2000.

Table 1

1999 Baseline Summary of All Claims for Patients with a Primary Diagnosis of Selected Musculoskeletal and Related Medical Conditions

File	Medicare Beneficiaries	Claims	Medicare Payments	Average Payment Per Beneficiary	Average Payment Per Claim
All Files	5,811,440	215,998,220	$41,362,447,475	$7,117.42	$191.49
DME	1,697,640	9,433,780	$1,135,903,530	$669.11	$120.41
Home Health	684,960	2,338,260	$1,849,526,230	$2,700.20	$790.98
Hospice	58,400	141,720	$262,461,482	$4,494.20	$1,851.97
Inpatient	1,651,980	3,115,040	$19,899,049,229	$12,045.58	$6,388.06
Outpatient	4,710,980	28,758,020	$4,205,937,375	$892.79	$146.25
Professional	5,790,340	171,467,460	$11,698,392,594	$2,020.33	$68.23
SNF	350,480	743,940	$2,311,177,035	$6,594.32	$3,106.67

Inpatient services, $19.9 billion, accounted for nearly half (48.1%) of total 1999 Medicare program payments for these beneficiaries, with professional services ($11.7 billion) and SNF payments ($2.3 billion) accounting for an additional 10.2 percent and 5.6 percent, respectively. On average, Medicare program payments per beneficiary were highest for inpatient hospital services ($12,046), SNF care ($6,594) and hospice services ($4,494) and lowest for outpatient services ($893) and DME ($669).

Comparison of Beneficiaries Receiving Chiropractic Services with Those Treated by Other Provider Types

The next step in the analysis was to compare the patterns of service utilization and payments of beneficiaries who received Chiropractic services with beneficiaries treated by other providers. To complete this analysis, the 5.8 million Medicare beneficiaries identified in the extract were divided into two groups based on the occurrence of provider specialty code "35 – Chiropractic" on their Part B Physician/Supplier and DME claims. The results are summarized in Table 2 and Table 3.

Table 2 compares the use of all medical services and their associated Medicare payments for these two groups of beneficiaries. In Table 3, the comparison is restricted to just claims for the treatment of the selected medical conditions that formed the basis of the initial data extract.

All Claims

As shown in Tables 2 and 3, approximately 1.6 million (26.8 percent) of the 5.8 million Medicare beneficiaries with primary diagnoses of selected musculoskeletal and related medical conditions received treatment from Doctors of Chiropractic. In comparing these beneficiaries with those who did not receive Chiropractic care, several interesting results stand out.

Table 2

Summary of All Claims for Beneficiaries with a Primary Diagnosis of Selected Musculoskeletal and Related Medical Conditions
1999

Beneficiary Type	File	Medicare Beneficiaries	Claims	Medicare Payments	Average Payment Per Beneficiary	Average Payment Per Claim
Beneficiary not seen by a Doctor of Chiropractic	All Files	4,253,720	164,013,400	$34,467,924,349	$8,103.01	$210.15
	DME	1,365,200	7,911,360	$969,683,906	$710.29	$122.57
	Home Health	592,940	2,096,620	$1,677,461,033	$2,829.06	$800.08
	Hospice	51,640	125,980	$233,721,204	$4,525.97	$1,855.22
	Inpatient	1,356,480	2,635,500	$16,832,524,858	$12,408.97	$6,386.84
	Outpatient	3,554,480	22,771,980	$3,435,468,009	$966.52	$150.86
	Professional	4,232,620	127,800,140	$9,213,109,498	$2,176.69	$72.09
	SNF	309,620	671,820	$2,105,955,841	$6,801.74	$3,134.70
Beneficiary seen by a Doctor of Chiropractic	All Files	1,557,720	51,984,820	$6,894,523,126	$4,426.03	$132.63
	DME	332,440	1,522,420	$166,219,623	$500.00	$109.18
	Home Health	92,020	241,640	$172,065,197	$1,869.87	$712.07
	Hospice	6,760	15,740	$28,740,278	$4,251.52	$1,825.94
	Inpatient	295,500	479,540	$3,066,524,371	$10,377.41	$6,394.72
	Outpatient	1,156,500	5,986,040	$770,469,365	$666.21	$128.71
	Professional	1,557,720	43,667,320	$2,485,283,097	$1,595.46	$56.91
	SNF	40,860	72,120	$205,221,194	$5,022.55	$2,845.55

Examination of the data for all claims for all services (and their associated Medicare payments) utilized during 1999 (Table 2) reveals some very clear differences between the two groups of beneficiaries. Beneficiaries treated by Doctors of Chiropractic comprise 26.8 percent of the beneficiaries with any of the selected ICD-9 diagnosis codes and 24.1 percent of their claims. However, they generated only 16.7 percent of total Medicare payments, a significantly lower proportion than their numbers would suggest. Recipients of Chiropractic care averaged 33.4 claims per beneficiary in 1999, 5 fewer claims per person than beneficiaries not receiving Chiropractic care. More importantly, their per capita payments for all Medicare services utilized during 1999 were nearly 50 percent lower than those for recipients who did not receive Chiropractic care ($4,426 versus $8,103). Similarly, the average payment per claim for all

Medicare services used during 1999 is almost 40 percent lower for beneficiaries who received Chiropractic services ($132.63 versus $210.15). Regardless of the type of claim, average payment per beneficiary was substantially lower for beneficiaries treated by a Doctor of Chiropractic. With only two exceptions (e.g., hospice and inpatient hospital), similar findings are noted for average payment per claim. However, even in the case of these two exceptions, the average costs per service are nearly identical for the two groups of beneficiaries. Therefore, when all claims for all services are examined, it would appear that Medicare beneficiaries who were treated by Doctors of Chiropractic during 1999 had fewer Medicare claims per capita and lower average Medicare payments for all Medicare services than those who did not.

Selected Musculoskeletal and Related Claims Only

When the comparison of utilization and Medicare payments is restricted to just claims for the selected musculoskeletal and related claims used to define the initial extract, the overall results, while similar, also include some key findings (Table 3). For example, while constituting 26.8 percent of Medicare beneficiaries, beneficiaries who received Chiropractic care during 1999 generated 42.3 percent of such claims. They averaged nearly 8 claims per capita compared to only 4 claims per capita for beneficiaries who did not receive Chiropractic care.

Table 3
Summary of All Musculoskeletal and Related Claims for Patients with a Primary Diagnosis of Selected Musculoskeletal and Related Medical Conditions
1999

Beneficiary Type	File	Medicare Beneficiaries	Claims	Medicare Payments	Average Payment Per Beneficiary	Average Payment Per Claim
Beneficiary not seen by a Doctor of Chiropractic	All Files	4,253,720	16,940,020	$2,524,698,640	$593.53	$149.04
	DME	208,220	489,320	$53,808,762	$258.42	$109.97
	Home Health	55,060	114,160	$84,816,650	$1,540.44	$742.96
	Hospice	80	140	$274,067	$3,425.84	$1,957.62
	Inpatient	142,060	157,500	$858,751,277	$6,044.99	$5,452.39
	Outpatient	1,578,360	2,985,540	$390,056,484	$247.13	$130.65
	Professional	3,916,100	13,163,860	$1,044,195,022	$266.64	$79.32
	SNF	19,600	29,500	$92,796,379	$4,734.51	$3,145.64
Beneficiary seen by a Doctor of Chiropractic	All Files	1,557,720	12,439,080	$592,095,669	$380.10	$47.60
	DME	21,940	40,340	$3,841,226	$175.08	$95.22
	Home	4,560	8,320	$5,472,240	$1,200.0	$657.72

Health				5	
Inpatient	18,220	20,320	$104,815,244	$5,752.76	$5,158.23
Outpatient	207,720	408,300	$54,193,176	$260.90	$132.73
Professional	1,556,640	11,958,900	$414,821,202	$266.48	$34.69
SNF	1,820	2,900	$8,952,580	$4,919.00	$3,087.10

However, despite the fact that they comprise slightly more than one-fourth of all Medicare beneficiaries in the extract and had twice as many claims per capita (over 40 percent of all services associated with the selected diagnoses), Medicare payments for the treatment of these selected medical conditions for beneficiaries receiving Chiropractic care constituted only 19 percent of all Medicare payments for the treatment of these conditions. Furthermore, beneficiaries treated by Doctors of Chiropractic had average payments per capita that were nearly 40 percent lower than those for beneficiaries who received care from other providers ($380.10 versus $593.53). Also, average payment per claim for the treatment of these medical conditions was nearly two-thirds lower for beneficiaries receiving Chiropractic care compared to beneficiaries not seen by Doctors of Chiropractic ($47.60 versus $149.04). As with the summary of all claims (see above), with few exceptions, regardless of the type of claim, average payment per beneficiary and average payment per claim were lower for beneficiaries who received Chiropractic care. Therefore, Medicare beneficiaries treated by Doctors of Chiropractic averaged twice as many claims per capita but generated significantly lower Medicare payments than beneficiaries receiving services from other providers.

Subsequent Use of Medicare Services

Using a methodology developed for a previous study,[6] further analysis was conducted to examine subsequent service utilization patterns for both groups of beneficiaries. The analysis consists of chronologically ordering the claims data for each beneficiary and summarizing the information by "encounter." An encounter is defined as a chronologically contiguous episode of care at a particular provider type from a single SAF file. Because date of service is not listed on the claims, the chronological order was determined by using incurred quarter and claim receipt date. Conflicts in the ordering of records from different files are resolved using a predetermined sequence of files (Inpatient, SNF, HHA, outpatient, hospice, Part B physician/supplier, and DME). Only the first contact with a primary diagnosis of one of the selected medical conditions and the subsequent two encounters for Medicare services are included in this analysis. Results of the analysis of subsequent use of Medicare services are presented in Tables 4 and 5.

All Claims

Starting with the first encounter during 1999 for any of the selected ICD-9 diagnosis codes used to define the initial extract, we began our analysis of beneficiaries' subsequent

[6] Muse & Associates, *An Analysis of Rehabilitation Services "Flow" Patterns and Payments by Provider Setting for Medicare Beneficiaries,* Washington, DC: November 1997.

contacts with the Medicare program by examining the next two encounters for all services (Tables 4). Presented in Table 4 are a count of beneficiaries, total payments, and average payment per beneficiary for each of the first three encounters, including the initial encounter containing a claim with any of the selected primary diagnosis codes.

Table 4
Subsequent Encounters with the Medicare Program for
Beneficiaries with a Primary Diagnosis of Selected Musculoskeletal and Related Medical Conditions
All Claims: 1999
(by treatment status and contact)

Beneficiary Type	Encounter	Medicare Beneficiaries	Percent of Medicare Beneficiaries	Medicare Payments	Medicare Payment Per Beneficiary
Beneficiary not seen by a Doctor of Chiropractic	First	4,253,720	100.0%	$1,463,955,180	$344.16
	Second	3,383,140	79.5%	$2,442,063,163	$721.83
	Third	3,117,840	73.3%	$1,497,207,909	$480.21
Beneficiary seen by a Doctor of Chiropractic	First	1,557,720	100.0%	$589,136,161	$378.20
	Second	1,079,260	69.3%	$547,406,907	$507.21
	Third	1,033,100	66.3%	$408,319,296	$395.24

In general, the majority of Medicare beneficiaries in both groups had multiple encounters with the Medicare program in 1999. Of the beneficiaries not treated by Doctors of Chiropractic, approximately 80 percent had a second encounter with the Medicare program during 1999, following their initial claim for one of the selected primary diagnoses. Nearly three-quarters (73.3 percent) of these beneficiaries also had a third encounter later that year. By comparison, 69 percent of beneficiaries who received Chiropractic care had a second encounter with the Medicare program and 66 percent had a third encounter during 1999.

Interestingly, beneficiaries not receiving Chiropractic services had average payments per beneficiary for all services for their first encounter with the Medicare program during 1999 that were nearly 10 percent lower than average payments for beneficiaries who received Chiropractic services ($344.16 versus $378.20). However, for the second and

third encounters, the situation is reversed. Beneficiaries receiving Chiropractic care had significantly lower average Medicare payments per encounter.

Selected Musculoskeletal and Related Claims Only

Considering only claims for the selected musculoskeletal and related diagnoses, the analysis of the first three encounters with the Medicare program during 1999 was repeated. The results of this analysis are presented in Table 5.

The data presented in Table 5 indicate several interesting findings. Not surprising, a much smaller proportion of beneficiaries with any of the selected musculoskeletal and related medical conditions during 1999 had a second or third encounter with the Medicare program for these conditions than was the case with their overall use of Medicare services. The great majority of treatments for these medical conditions were received in the same provider setting. However, as was the case with their use of all services, a much lower proportion of beneficiaries treated by Doctors of Chiropractic had a second or third encounter with the Medicare program.

Table 5
Subsequent Contacts with the Medicare Program for
Beneficiaries with a Primary Diagnosis of Selected Musculoskeletal and Related Medical Conditions: 1999
Musculoskeletal and Related Claims Only
(by treatment status and contact)

Beneficiary Type	Encounter	Medicare Beneficiaries	Percent of Medicare Beneficiaries	Medicare Payments	Medicare Payment Per Beneficiary
Beneficiary not seen by a Doctor of Chiropractic	First	4,253,700	100.0%	$806,570,036	$189.62
	Second	1,447,700	34.0%	$546,358,964	$377.40
	Third	831,200	19.5%	$289,624,275	$348.44
Beneficiary seen by a Doctor of Chiropractic	First	1,557,720	100.0%	$329,015,857	$211.22
	Second	222,040	14.3%	$69,002,782	$310.77
	Third	169,880	10.9%	$48,738,672	$286.90

Medicare beneficiaries receiving Chiropractic care had average Medicare payments for their first encounter for these selected musculoskeletal and related medical conditions that were approximately 11 percent higher than the average payment for beneficiaries treated by other providers. This may be due, at least in part, to the fact that beneficiaries receiving Chiropractic care for the treatment of these medical

conditions averaged twice as many claims per capita compared to beneficiaries who received treatment from other providers. Thus, when aggregated over the entire first encounter, the total cost for that encounter may be higher for beneficiaries receiving Chiropractic care, even though their average Medicare payment per claim was significantly lower. For those beneficiaries who had a second and/or third encounter for these conditions during 1999, both the proportion of beneficiaries having second or third encounters and the average Medicare payments per encounter were significantly lower for beneficiaries treated by Doctors of Chiropractic.

Why are there Differences Between Beneficiaries Seen and Not Seen by Doctors of Chiropractic?

Our comparative analysis of the use of and payments for services by Medicare beneficiaries who were/were not treated by Doctors of Chiropractic for these selected primary diagnoses during 1999 indicates that there are differences between the two groups. In general, beneficiaries receiving Chiropractic care had lower average payments per capita and per claim for all Medicare services and for claims associated with the treatment of their musculoskeletal and related medical problems. With the exception of the first encounter involving a principal diagnosis of one of these selected diagnoses, they also had lower average payments per beneficiary for the subsequent two encounters with the Medicare system.

Given these findings, what factors explain the differences between these two groups of Medicare beneficiaries? Is it gender, age, and/or acuity? First we examine gender. Then we consider the age distributions of the two groups of beneficiaries and, finally, acuity.

Gender

As shown in Table 6, a slightly lower proportion of females received treatment from Doctors of Chiropractic than from other provider types (58.8. percent versus 63.7 percent). Conversely, a higher proportion of males received Chiropractic care than treatments from other providers (41.2 percent versus 36.3 percent).

Table 6
Number of Beneficiaries
by Gender and Treatment Status

Beneficiary Type	Female	Male	Total
Beneficiary not seen by a Doctor of Chiropractic	2,710,420	1,543,300	4,253,720
Percent	63.7%	36.3%	100.0%
Beneficiary seen by a Doctor of Chiropractic	916,180	641,540	1,557,720
Percent	58.8%	41.2%	100.0%
Total	3,626,600	2,184,840	5,811,440

While these differences, on the order of 5 percentage points, exist, they do not appear to be sufficiently large by themselves to account for the service utilization and payment differences between the two groups of beneficiaries. Gender, therefore, does not appear to have high explanatory power to differentiate between these groups.

Age

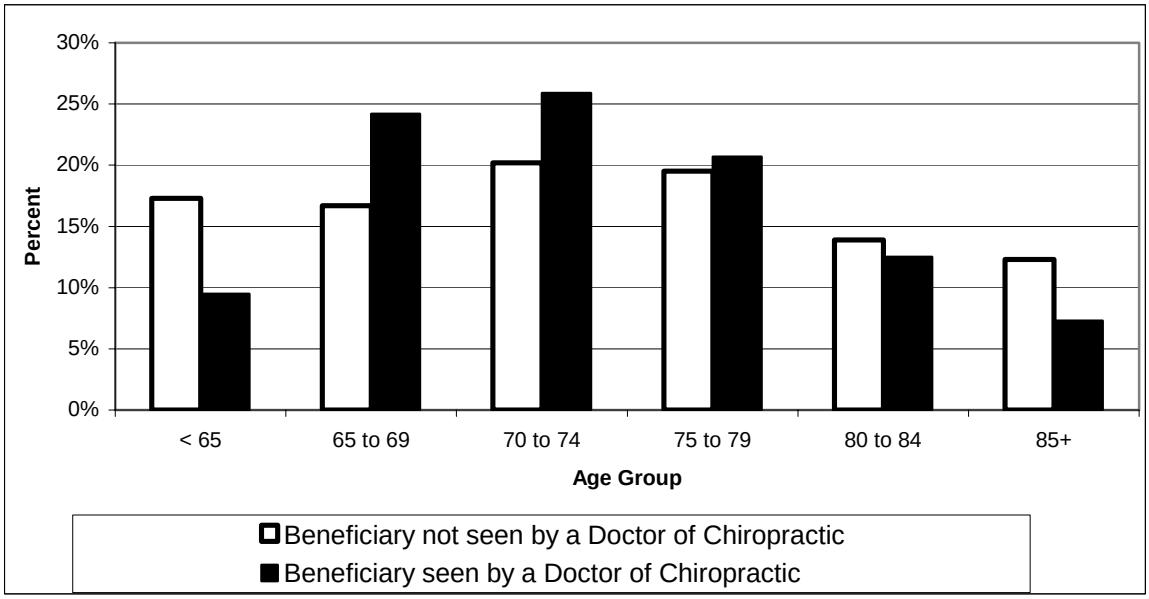
Data on the age distribution of the two groups of beneficiaries are presented in Table 7 and Figure 1. Examination of the data suggests some potentially important differentiating factors. It is clear from a review of Table 7 and Figure 1that Medicare beneficiaries under age 65 (i.e., the "disabled" and "ESRD" populations) are much less likely to have received Chiropractic care. Likewise, among beneficiaries 80 years of age and older, a smaller proportion were treated by Doctors of Chiropractic. Conversely, a higher percentage of beneficiaries between 65 and 74 years of age received Chiropractic care. For beneficiaries 75-79 years of age, approximately the same proportion did and did not receive Chiropractic care. This suggests that medical doctors, not Doctors of Chiropractic, treat older and/or sicker Medicare beneficiaries. Therefore, acuity may be an important factor in explaining differences in the use of Chiropractic services among Medicare beneficiaries.

Table 7
Age Distribution of Beneficiaries with a Primary Diagnosis of Selected Musculoskeletal and Related Medical Conditions
(by gender and treatment status)

Beneficiary Type	Age Group	Female	% Female	Male	**%** Male	Total	%
Beneficiary not seen by a Doctor of Chiropractic	64 and Younger	378,080	13.9%	359,840	23.3%	737,920	17.3%
	65 to 69	447,020	16.5%	264,980	17.2%	712,000	16.7%
	70 to 74	549,400	20.3%	310,840	20.1%	860,240	20.2%
	75 to 79	548,640	20.2%	281,380	18.2%	830,020	19.5%
	80 to 84	402,140	14.8%	187,920	12.2%	590,060	13.9%
	85 and Older	385,140	14.2%	138,340	9.0%	523,480	12.3%
	Total	2,710,420	100.0%	1,543,300	100.0%	4,253,720	100.0%
Beneficiary seen by a Doctor of Chiropractic	64 and Younger	77,400	8.4%	70,180	10.9%	147,580	9.5%
	65 to 69	216,880	23.7%	159,460	24.9%	376,340	24.2%
	70 to 74	233,480	25.5%	170,140	26.5%	403,620	25.9%
	75 to 79	193,280	21.1%	128,540	20.0%	321,820	20.7%
	80 to 84	120,920	13.2%	74,480	11.6%	195,400	12.5%
	85 and Older	74,220	8.1%	38,740	6.0%	112,960	7.3%
	Total	916,180	100.0%	641,540	100.0%	1,557,720	100.0%

Figure 1

Age Distribution of Beneficiaries with a Primary
Diagnosis of Selected Musculoskeletal and Related Medical Conditions



Removing Acuity

There is no simple or direct way to measure medical acuity from the data included in the 1999 5 Percent SAF. Accordingly, to assess whether acuity is important in differentiating beneficiaries who did/did not receive Chiropractic care during 1999 for the treatment of these selected medical diagnoses, we used an approach that deleted the institutionalized population which, by definition, has high medical acuity.

To test this hypothesis, we deleted beneficiaries with inpatient hospital, SNF, and/or hospice claims during 1999 and reran the service utilization and cost analyses. Controlling for acuity of beneficiaries' overall medical conditions results in a mostly ambulatory patient population, the type of population most likely to seek out and benefit from Chiropractic care. The findings from our reanalysis are presented in Tables 8 and 9.

All Claims

Presented in Table 8 are analytical results from the reanalysis of all claims for primarily ambulatory Medicare beneficiaries. As shown in Table 8, beneficiaries treated by Doctors of Chiropractic had lower overall payments per claim and per beneficiary for all Medicare services used during 1999 than beneficiaries receiving treatment from other providers. Likewise, for every type of claim, Medicare payments per patient and per claim are substantially lower for beneficiaries who received Chiropractic care for their musculoskeletal land related medical conditions.

Table 8

Summary of All Claims for Beneficiaries with a Primary
Diagnosis of Selected Musculoskeletal and Related Medical Conditions

(Inpatient, Skilled Nursing Facility, and Hospice Beneficiaries Deleted)
1999

Beneficiary Type	File	Medicare Beneficiaries	Claims	Medicare Payments	Average Payment Per Beneficiary	Average Payment Per Claim
Beneficiary not seen by Doctor of Chiropractic	All Files	2,878,900	77,855,140	$5,815,128,170	$2,019.91	$74.69
	DME	673,080	3,155,200	$382,771,913	$568.69	$121.31
	Home Health	109,560	424,500	$308,916,874	$2,819.61	$727.72
	Outpatient	2,295,760	12,170,100	$1,543,707,105	$672.42	$126.84
	Professional	2,861,760	62,105,340	$3,579,732,279	$1,250.88	$57.64
Beneficiary seen by Doctor of Chiropractic	All Files	1,260,140	34,251,780	$1,937,014,882	$1,537.14	$56.55
	DME	208,960	825,780	$84,162,077	$402.77	$101.92
	Home Health	15,460	47,080	$32,680,646	$2,113.88	$694.15
	Outpatient	886,360	3,885,300	$440,352,524	$496.81	$113.34
	Professional	1,260,140	29,493,620	$1,379,819,635	$1,094.97	$46.78

Selected Musculoskeletal and Related Claims Only

The data were reanalyzed with claims for the selected musculoskeletal and related diagnoses only (Table 9). As shown in Table 9, on the next page, primarily ambulatory beneficiaries treated by Doctors of Chiropractic had lower overall Medicare payments per capita and per claim than beneficiaries treated by other provider types. However, Chiropractic patients did generate slightly higher average Medicare payments per beneficiary for Outpatient services and moderately higher average payments per beneficiary for Professional services. In this case of Professional services, the higher average payment per beneficiary is the result of a higher number of beneficiary visits. For Outpatient services, the average payments per claim are nearly identical for the two groups of beneficiaries.

Table 9

Summary of Musculoskeletal and Related Claims Only for Patients with a Primary Diagnosis of Selected Musculoskeletal and Related Medical Conditions:
(Inpatient, Skilled Nursing Facility, and Hospice Beneficiaries Deleted)
1999

Beneficiary Type	File	Medicare Beneficiari	Claims	Medicare Payments	Average Payment Per	Average Payment Per

		es			Beneficiary	Claim
Beneficiary not seen by Doctor of Chiropractic	All Files	2,878,900	10,291,700	$808,179,022	$280.72	$78.53
	DME	113,020	250,120	$25,698,273	$227.38	$102.74
	Home Health	13,140	29,840	$19,834,639	$1,509.49	$664.70
	Outpatient	1,050,020	1,917,180	$244,832,344	$233.17	$127.70
	Professional	2,646,320	8,094,560	$517,813,766	$195.67	$63.97
Beneficiary seen by Doctor of Chiropractic	All Files	1,260,140	9,911340	$337,431,780	$267.77	$34.05
	DME	13,000	22,700	$1,917,973	$147.54	$84.49
	Home Health	780	1,520	$937,461	$1,201.87	$616.75
	Outpatient	146,240	276,080	$35,705,762	$244.16	$129.33
	Professional	1,259,300	9,611,040	$298,870,584	$237.33	$31.10

In conclusion, these results strongly suggest that Chiropractic care reduces per beneficiary costs to the Medicare program under current law.

Potential Future Savings Under Medicare and/or the Addition of Prescription Drugs

Congress and the President are committed to Medicare reform and establishment of some form of a prescription drug benefit for the Medicare population.

Medicare Reform

A wide variety of approaches and proposals exist for Medicare reform. Some address the role of the private sector in the program. Others focus on incentives that could lead to some over utilization of services by the elderly. These proposals may result in either increased or decreased access to Chiropractic services. The findings of our current law analysis strongly suggest that decreased access to Chiropractic services would increase program costs. This is contrary to the purpose of the Medicare program, which is to provide cost-effective health care services to the broadest group of Medicare beneficiaries. Attention should, therefore, be paid to access to Chiropractic Services during the Medicare reform debate.

A Prescription Drug Benefit

Doctors, not beneficiaries, write prescription drug scripts. Extensive research shows that the more visits a person has to a medical doctor, the more prescriptions they are likely to receive. Our analysis found that, overall, those beneficiaries who used Chiropractic services, have lower medical doctor costs and, by extrapolation, lower prescription drug costs. Thus, enhanced access to Chiropractic services could drive down the number of

prescriptions even further. Therefore, some savings would probably accrue to the Medicare program if access to Chiropractic services was increased.

(V:ACA/Medicare 2001/Report)

Appendix A

List of Diagnoses Commonly Treated By Doctors of Chiropractic

Appendix A

List of Diagnoses Commonly Treated By Doctors of Chiropractic

ICD-9-CM CODES

International Classification of Diseases, 9th Revision, Clinical Modification Codes (ICD-9–CM Codes) are designed to classify illnesses, injuries, and patient-health care provider encounters for services.

NOTE: This is not an all-inclusive list of ICD-9 codes, and is provided simply as a list of commonly used codes by DCs.

ICD-9-CM Codes

ICD CODES – NUMERIC CATEGORY LISTING

CODE	*DESCRIPTION*
320-389.1.1	**Diseases of the Nervous System and Sense Organs**
333.83	SPASMODIC TORTICOLLIS
346	MIGRAINE
346.0	CLASSIC MIGRAINE
346.1	COMMON MIGRAINE
346.2	VARIANTS OF MIGRAINE
346.8	OTHER FORMS OF MIGRAINE
346.9	MIGRAINE, UNSPECIFIED
350.1	TRIGEMINAL NEURALGIA
350.2	ATYPICAL FACE PAIN
351	FACIAL NERVE DISORDER
351.0	BELL'S PALSY
352	DISORDERS OF OTHER CRANIAL NERVES
352.3	DISORDERS OF PNEUMOGASTRIC (10TH) NERVE
352.9	UNSPECIFIED DISORDER OF CRANIAL NERVES
353	NERVE ROOT AND PLEXUS DISORDERS
353.0	BRACHIAL PLEXUS LESIONS
353.1	LUMBOSACRAL PLEXUS LESIONS
353.2	CERVICAL ROOT LESIONS, NOT ELSEWHERE CLASSIFIED
353.3	THORACIC ROOT LESIONS, NOT ELSEWHERE CLASSIFIED
353.4	LUMBOSACRAL ROOT LESIONS, NOT ELSEWHERE CLASSIFIED
353.8	OTHER NERVE ROOT AND PLEXUS DISORDERS
353.9	UNSPECIFIED NERVE ROOT AND PLEXUS DISORDER
354	MONONEURITIS UPPER LIMB
354.0	CARPAL TUNNEL SYNDROME
354.1	OTHER LESION OF MEDIAN NERVE

354.2 LESION OF ULNAR NERVE
354.3 LESION OF RADIAL NERVE
354.4 CAUSALGIA OF UPPER LIMB
354.5 MONONEURITIS MULTIPLEX
354.8 OTHER MONONEURITIS OF UPPER LIMB
354.9 MONONEURITIS OF UPPER LIMB, UNSPECIFIED
355 MONONEURITIS LEG
355.0 LESION OF SCIATIC NERVE
355.1 MERALGIA PARESTHETICA
355.4 LESION OF MEDIAL POPLITEAL NERVE
355.5 TARSAL TUNNEL SYNDROME
381.4 NONSUPPURATIVE OTITIS MEDIA, NOT SPECIFIED AS ACUTE OR CHRONIC
386 VERTIGINOUS SYNDROME
386.0 MENIERE'S DISEASE
386.3 LABYRINTHITIS, UNSPECIFIED
386.9 UNSPECIFIED VERTIGINOUS SYNDROMES AND LABYRINTHINE DISORDERS

390-459 Diseases of the Circulatory System
401.9 UNSPECIFIED ESSENTIAL HYPERTENSION

520-579 Diseases of the Digestive System
524.6 TEMPOROMANDIBULAR JOINT DISORDERS, UNSPECIFIED

630-677 Complications of Pregnancy, Childbirth, and Puerperium
648.7.1.1.1.1 BONE AND JOINT DISORDERS OF BACK, PELVIS, AND LOWER LIMBS OF MOTHER, COMPLICATING PREGNANCY, CHILDBIRTH, OR THE PUERPERIUM

710-739 Diseases of the Neuromusculoskeletal System and Connective Tissue
710.4 POLYMYOSITIS
714.3 CHRONIC OR UNSPECIFIED POLYARTICULAR JUVENILE RHEUMATOID ARTHRITIS
715 OSTEOARTHROSIS, GENERALIZED
715.0 OSTEOARTHROSIS AND ALLIED DISORDERS
715.00 OSTEOARTHROSIS, GENERALIZED, INVOLVING UNSPECIFIED SITE
715.04 OSTEOARTHROSIS, GENERALIZED, INVOLVING HAND
715.09 OSTEOARTHROSIS, GENERALIZED, INVOLVING MULTIPLE SITES
715.1 OSTEOARTHROSIS, LOCALIZED, PRIMARY
715.11 OSTEOARTHROSIS, LOCALIZED, PRIMARY, INVOLVING SHOULDER REGION
715.15 OSTEOARTHROSIS, LOCALIZED, PRIMARY, INVOLVING PELVIC REGION AND THIGH
715.18 OSTEOARTHROSIS, LOCALIZED, PRIMARY, INVOLVING OTHER SPECIFIED SITES
715.2 OSTEOARTHROSIS, LOCALIZED, SECONDARY

715.3	OSTEOARTHROSIS, LOCALIZED, NOT SPECIFIED WHETHER PRIMARY OR SECONDARY
715.30	OSTEOARTHROSIS, LOCALIZED, NOT SPECIFIED WHETHER PRIMARY OR SECONDARY, UNSPECIFIED
715.38	OSTEOARTHROSIS, LOCALIZED, NOT SPECIFIED WHETHER PRIMARY OR SECONDARY, INVOLVING OTHER SPECIFIED SITES
715.8	OSTEOARTHROSIS INVOLVING OR WITH MENTION OF MORE THAN ONE SITE, BUT NOT SPECIFIED AS GENERALIZED
715.80	OSTEOARTHROSIS INVOLVING OR WITH MENTION OF MORE THAN ONE SITE, BUT NOT SPECIFIED AS GENERALIZED, AND INVOLVING UNSPECIFIED SITE, UNSPECIFIED
715.89	OSTEOARTHROSIS INVOLVING OR WITH MENTION OF MULTIPLE SITES, BUT NOT SPECIFIED AS GENERALIZED
715.9	OSTEOARTHROSIS, UNSPECIFIED WHETHER GENERALIZED OR LOCALIZED, INVOLVING UNSPECIFIED SITE
715.90	OSTEOARTHROSIS, UNSPECIFIED WHETHER GENERALIZED OR LOCALIZED, UNSPECIFIED
715.96	OSTEOARTHROSIS, UNSPECIFIED WHETHER GENERALIZED OR LOCALIZED, INVOLVING LOWER LEG
715.98	OSTEOARTHROSIS, UNSPECIFIED WHETHER GENERALIZED OR LOCALIZED, INVOLVING OTHER SPECIFIED SITES
716.1	TRAUMATIC ARTHROPATHY
716.66	UNSPECIFIED MONOARTHRITIS INVOLVING LOWER LEG
716.9	UNSPECIFIED ARTHROPATHY
716.90	UNSPECIFIED ARTHROPATHY, SITE UNSPECIFIED, UNSPECIFIED
716.91	UNSPECIFIED ARTHROPATHY INVOLVING SHOULDER REGION
716.95	UNSPECIFIED ARTHROPATHY INVOLVING PELVIC REGION AND THIGH
716.96	UNSPECIFIED ARTHROPATHY INVOLVING LOWER LEG
716.97	UNSPECIFIED ARTHROPATHY INVOLVING ANKLE AND FOOT
716.99	UNSPECIFIED ARTHROPATHY INVOLVING MULTIPLE SITES
717	INTERNAL DERANGEMENT OF KNEE
717.5	DERANGEMENT OF MENISCUS, NOT ELSEWHERE CLASSIFIED
717.7	CHONDROMALACIA OF PATELLA
717.8	OTHER INTERNAL DERANGEMENT OF KNEE
717.9	UNSPECIFIED INTERNAL DERANGEMENT OF KNEE
718	OTHER DERANGEMENT OF JOINT
718.0	ARTICULAR CARTILAGE DISORDER
718.00	ARTICULAR CARTILAGE DISORDER, UNSPECIFIED
718.4	CONTRACTURE OF JOINT
718.5	ANKYLOSIS OF JOINT
718.50	ANKYLOSIS OF JOINT, UNSPECIFIED
718.55	ANKYLOSIS OF JOINT, PELVIS
718.85	OTHER JOINT DERANGEMENT, NOT ELSEWHERE CLASSIFIED
718.88	OTHER JOINT DERANGEMENT, NOT ELSEWHERE CLASSIFIED, INVOLVING OTHER SPECIFIED SITES
718.98	UNSPECIFIED DERANGEMENT OF JOINT OF OTHER SPECIFIED SITES

719.4	PAIN IN JOINT
719.40	PAIN IN JOINT, UNSPECIFIED
719.41	PAIN IN JOINT INVOLVING SHOULDER REGION
719.42	PAIN IN JOINT INVOLVING UPPER ARM
719.43	PAIN IN JOINT INVOLVING FOREARM
719.44	PAIN IN JOINT INVOLVING HAND
719.45	PAIN IN JOINT INVOLVING PELVIC REGION AND THIGH
719.46	PAIN IN JOINT INVOLVING LOWER LEG
719.47	PAIN IN JOINT INVOLVING ANKLE AND FOOT
719.48	PAIN IN JOINT INVOLVING OTHER SPECIFIED SITES
719.49	PAIN IN JOINT INVOLVING MULTIPLE SITES
719.5	STIFFNESS OF JOINT, NOT ELSEWHERE CLASSIFIED
719.50	STIFFNESS OF JOINT, NOT ELSEWHERE CLASSIFIED, UNSPECIFIED
719.51	STIFFNESS OF JOINT, NOT ELSEWHERE CLASSIFIED, INVOLVING SHOULDER REGION
719.55	STIFFNESS OF JOINT, NOT ELSEWHERE CLASSIFIED, INVOLVING UNSPECIFIED SITE
719.58	STIFFNESS OF JOINT, NOT ELSEWHERE CLASSIFIED, INVOLVING OTHER SPECIFIED SITES
719.59	STIFFNESS OF JOINT, NOT ELSEWHERE CLASSIFIED, INVOLVING MULTIPLE SITES
719.6	OTHER SYMPTOMS REFERABLE TO JOINT
719.60	OTHER SYMPTOMS REFERABLE TO JOINT, UNSPECIFIED
719.65	OTHER SYMPTOMS REFERABLE TO JOINT, PELVIS
719.68	OTHER SYMPTOMS REFERABLE TO JOINT, INVOLVING OTHER SPECIFIED SITES
719.69	OTHER SYMPTOMS REFERABLE TO JOINT, INVOLVING MULTIPLE SITES
719.7	DIFFICULTY IN WALKING
719.70	DIFFICULTY IN WALKING, UNSPECIFIED
719.75	DIFFICULTY IN WALKING, PELVIS
719.8	OTHER SPECIFIED DISORDERS OF JOINT, INVOLVING OTHER SPECIFIED SITE
719.80	OTHER SPECIFIED DISORDERS OF JOINT, INVOLVING OTHER SPECIFIED SITE, UNSPECIFIED
719.85	OTHER SPECIFIED DISORDERS OF JOINT, INVOLVING OTHER SPECIFIED SITE, PELVIS
719.88	OTHER SPECIFIED DISORDERS OF JOINT, INVOLVING OTHER SPECIFIED SITES
719.89	OTHER SPECIFIED DISORDERS OF JOINT, INVOLVING MULTIPLE SITES
719.9	UNSPECIFIED DISORDER OF JOINT
719.90	UNSPECIFIED DISORDER OF JOINT, UNSPECIFIED
719.95	UNSPECIFIED DISORDER OF JOINT, PELVIS
719.98	UNSPECIFIED DISORDER OF JOINT
719.99	UNSPECIFIED DISORDER OF JOINT
720	ANKYLOSING SPONDYLITIS AND OTHER INFLAMMATORY SPONDYLOPATHIES
720.0	ANKYLOSING SPONDYLITIS

720.1	SPINAL ENTHESOPATHY
720.2	SACROILIITIS, NOT ELSEWHERE CLASSIFIED
720.8	OTHER INFLAMMATORY SPONDYLOPATHIES
720.81	INFLAMMATORY SPONDYLOPATHIES IN DISEASES CLASSIFIED ELSEWHERE
720.9	UNSPECIFIED INFLAMMATORY SPONDYLOPATHY
721	SPONDYLOSIS AND ALLIED DISORDERS
721.0	CERVICAL SPONDYLOSIS WITHOUT MYELOPATHY
721.1	CERVICAL SPONDYLOSIS WITH MYELOPATHY
721.2	THORACIC SPONDYLOSIS WITHOUT MYELOPATHY
721.3	LUMBOSACRAL SPONDYLOSIS WITHOUT MYELOPATHY
721.4	THORACIC OR LUMBAR SPONDYLOSIS WITH MYELOPATHY
721.41	SPONDYLOSIS WITH MYELOPATHY, THORACIC REGION
721.42	SPONDYLOSIS WITH MYELOPATHY, LUMBAR REGION
721.5	KISSING SPINE
721.6	ANKYLOSING VERTEBRAL HYPEROSTOSIS
721.7	TRAUMATIC SPONDYLOPATHY
721.8	OTHER ALLIED DISORDERS OF SPINE
721.9	SPONDYLOSIS OF UNSPECIFIED SITE
721.90	SPONDYLOSIS OF UNSPECIFIED SITE WITHOUT MENTION OF MYELOPATHY
721.91	SPONDYLOSIS OF UNSPECIFIED SITE WITH MYELOPATHY
722	INTERVERTEBRAL DISC DISORDERS
722.0	DISPLACEMENT OF CERVICAL INTERVERTEBRAL DISC WITHOUT MYELOPATHY
722.1	DISPLACEMENT OF THORACIC OR LUMBAR INTERVERTEBRAL DISC WITHOUT MYELOPATHY
722.10	DISPLACEMENT OF LUMBAR INTERVERTEBRAL DISC WITHOUT MYELOPATHY
722.11	DISPLACEMENT OF THORACIC INTERVERTEBRAL DISC WITHOUT MYELOPATHY
722.2	DISPLACEMENT OF INTERVERTEBRAL DISC, SITE UNSPECIFIED, WITHOUT MYELOPATHY
722.3	SCHMORL'S NODES
722.30	SCHMORL'S NODES, UNSPECIFIED
722.31	SCHMORL'S NODES OF THORACIC REGION
722.32	SCHMORL'S NODES OF LUMBAR REGION
722.4	DEGENERATION OF CERVICAL INTERVERTEBRAL DISC
722.5	DEGENERATION OF THORACIC OR LUMBAR INTERVERTEBRAL DISC
722.51	DEGENERATION OF THORACIC OR THORACOLUMBAR INTERVERTEBRAL DISC
722.52	DEGENERATION OF LUMBAR OR LUMBOSACRAL INTERVERTEBRAL DISC
722.6	DEGENERATION OF INTERVERTEBRAL DISC, SITE UNSPECIFIED
722.7	INTERVERTEBRAL DISC DISORDER WITH MYELOPATHY
722.71	INTERVERTEBRAL DISC DISORDER WITH MYELOPATHY, CERVICAL REGION

722.72	INTERVERTEBRAL DISC DISORDER WITH MYELOPATHY, THORACIC REGION
722.73	INTERVERTEBRAL DISC DISORDER WITH MYELOPATHY, LUMBAR REGION
722.8	POSTLAMINECTOMY SYNDROME
722.80	POSTLAMINECTOMY SYNDROME, UNSPECIFIED
722.81	POSTLAMINECTOMY SYNDROME OF CERVICAL REGION
722.82	POSTLAMINECTOMY SYNDROME OF THORACIC REGION
722.83	POSTLAMINECTOMY SYNDROME OF LUMBAR REGION
722.9	OTHER AND UNSPECIFIED DISC DISORDER
722.90	OTHER AND UNSPECIFIED DISC DISORDER OF UNSPECIFIED REGION
722.91	OTHER AND UNSPECIFIED DISC DISORDER OF CERVICAL REGION
722.92	OTHER AND UNSPECIFIED DISC DISORDER OF THORACIC REGION
722.93	OTHER AND UNSPECIFIED DISC DISORDER OF LUMBAR REGION
723	OTHER DISORDERS OF CERVICAL REGION
723.0	SPINAL STENOSIS IN CERVICAL REGION
723.1	CERVICALGIA
723.2	CERVICOCRANIAL SYNDROME
723.3	CERVICOBRACHIAL SYNDROME (DIFFUSE)
723.4	BRACHIAL NEURITIS OR RADICULITIS NOS
723.5	TORTICOLLIS, UNSPECIFIED
723.6	PANNICULITIS SPECIFIED AS AFFECTING NECK
723.7	OSSIFICATION OF POSTERIOR LONGITUDINAL LIGAMENT IN CERVICAL REGION
723.8	OTHER SYNDROMES AFFECTING CERVICAL REGION
723.9	UNSPECIFIED NEUROMUSCULOSKELETAL DISORDERS AND SYMPTOMS REFERABLE TO NECK
724	OTHER AND UNSPECIFIED DISORDERS OF BACK
724.0	SPINAL STENOSIS, OTHER THAN CERVICAL
724.00	SPINAL STENOSIS OF UNSPECIFIED REGION
724.01	SPINAL STENOSIS OF THORACIC REGION
724.02	SPINAL STENOSIS OF LUMBAR REGION
724.09	SPINAL STENOSIS OF OTHER REGION
724.1	PAIN IN THORACIC SPINE
724.2	LUMBAGO
724.3	SCIATICA
724.4	THORACIC OR LUMBOSACRAL NEURITIS OR RADICULITIS, UNSPECIFIED
724.5	BACKACHE, UNSPECIFIED
724.6	DISORDERS OF SACRUM
724.7	DISORDERS OF COCCYX
724.70	UNSPECIFIED DISORDERS OF COCCYX
724.79	OTHER DISORDERS OF COCCYX
724.8	OTHER SYMPTOMS REFERABLE TO BACK
724.9	OTHER UNSPECIFIED BACK DISORDERS
726	PERIPHERAL ENTHESOPATHIES AND ALLIED SYNDROMES

726.0	ADHESIVE CAPSULITIS OF SHOULDER
726.1	DISORDERS OF BURSAE AND TENDONS IN SHOULDER REGION, UNSPECIFIED
726.10	ROTATOR CUFF SYNDROME OF SHOULDER AND ALLIED DISORDERS
726.11	CALCIFYING TENDINITIS OF SHOULDER
726.2	OTHER AFFECTIONS OF SHOULDER REGION, NOT ELSEWHERE CLASSIFIED
726.32	LATERAL EPICONDYLITIS
726.91	EXOSTOSIS OF UNSPECIFIED SITE
727	OTHER DISORDERS OF SYNOVIUM, TENDON, AND BURSA
727.0	SYNOVITIS AND TENOSYNOVITIS
727.00	SYNOVITIS NOS
727.01	SYNOVITIS AND TENOSYNOVITIS IN DISEASES CLASSIFIED ELSEWHERE
727.04	RADIAL STYLOID TENOSYNOVITIS
727.05	OTHER TENOSYNOVITIS OF HAND AND WRIST
727.06	TENOSYNOVITIS OF FOOT AND ANKLE
727.09	OTHER SYNOVITIS AND TENOSYNOVITIS
727.2	SPECIFIC BURSITIDES OFTEN OF OCCUPATIONAL ORIGIN
727.3	OTHER BURSITIS DISORDERS
727.9	UNSPECIFIED DISORDER OF SYNOVIUM, TENDON, AND BURSA
728.1	MUSCULAR CALCIFICATION AND OSSIFICATION
728.10	CALCIFICATION AND OSSIFICATION, UNSPECIFIED
728.12	TRAUMATIC MYOSITIS OSSIFICANS
728.4	LAXITY OF LIGAMENT
728.5	HYPERMOBILITY SYNDROME
728.6	CONTRACTURE OF PALMAR FASCIA
728.7	OTHER FIBROMATOSES OF MUSCLE, LIGAMENT, AND FASCIA
728.8	OTHER DISORDERS OF MUSCLE, LIGAMENT, AND FASCIA
728.81	INTERSTITIAL MYOSITIS
728.85	SPASM OF MUSCLE
728.9	UNSPECIFIED DISORDER OF MUSCLE, LIGAMENT, AND FASCIA
729	OTHER DISORDERS OF SOFT TISSUES
729.0	RHEUMATISM, UNSPECIFIED AND FIBROSITIS
729.1	MYALGIA AND MYOSITIS, UNSPECIFIED
729.2	NEURALGIA, NEURITIS, AND RADICULITIS, UNSPECIFIED
729.3	PANNICULITIS, UNSPECIFIED
729.30	PANNICULITIS
729.4	FASCIITIS, UNSPECIFIED
729.5	PAIN IN LIMB
729.8	OTHER NEUROMUSCULOSKELETAL SYMPTOMS REFERABLE TO LIMBS
729.81	SWELLING OF LIMB
729.9	OTHER AND UNSPECIFIED DISORDERS OF SOFT TISSUE
734	PES PLANUS
736.81	UNEQUAL LEG LENGTH (ACQUIRED)
737.0	ADOLESCENT POSTURAL KYPHOSIS
737.1	KYPHOSIS
737.10	KYPHOSIS (ACQUIRED) (POSTURAL)

737.12	KYPHOSIS, POSTLAMINECTOMY
737.19	KYPHOSIS (ACQUIRED) OTHER
737.2	LORDOSIS (ACQUIRED)
737.20	LORDOSIS (ACQUIRED) (POSTURAL)
737.21	LORDOSIS, POSTLAMINECTOMY
737.22	OTHER POSTSURGICAL LORDOSIS
737.29	LORDOSIS (ACQUIRED) OTHER
737.3	SCOLIOSIS (AND KYPHOSCOLIOSIS), IDIOPATHIC
737.30	KYPHOSCOLIOSIS AND SCOLIOSIS
737.31	RESOLVING INFANTILE IDIOPATHIC SCOLIOSIS
737.32	PROGRESSIVE INFANTILE IDIOPATHIC SCOLIOSIS
737.34	THORACOGENIC SCOLIOSIS
737.39	KYPHOSCOLIOSIS AND SCOLIOSIS OTHER
737.4	CURDVATURE OF SPINE ASSOCIATED WITH OTHER CONDITIONS
737.40	CURVATURE OF SPINE, UNSPECIFIED
737.41	KYPHOSIS ASSOCIATED WITH OTHER CONDITIONS
737.42	LORDOSIS ASSOCIATED WITH OTHER CONDITIONS
737.43	SCOLIOSIS ASSOCIATED WITH OTHER CONDITIONS
737.8	OTHER CURVATURES OF SPINE ASSOCIATED WITH OTHER CONDITIONS
738	OTHER ACQUIRED NEUROMUSCULOSKELETAL DEFORMITY
738.2	ACQUIRED DEFORMITY OF NECK
738.3	ACQUIRED DEFORMITY OF CHEST AND RIB
738.4	ACQUIRED SPONDYLOLISTHESIS
738.5	OTHER ACQUIRED DEFORMITY OF BACK OR SPINE
738.6	ACQUIRED DEFORMITY OF PELVIS
738.9	ACQUIRED NEUROMUSCULOSKELETAL DEFORMITY OF UNSPECIFIED SITE
739	NONALLOPATHIC LESIONS, NOT ELSEWHERE CLASSIFIED
739.0	NONALLOPATHIC LESIONS OF HEAD REGION, NOT ELSEWHERE CLASSIFIED
739.1	NONALLOPATHIC LESIONS OF CERVICAL REGION, NOT ELSEWHERE CLASSIFIED
739.2	NONALLOPATHIC LESIONS OF THORACIC REGION, NOT ELSEWHERE CLASSIFIED
739.3	NONALLOPATHIC LESIONS OF LUMBAR REGION, NOT ELSEWHERE CLASSIFIED
739.4	NONALLOPATHIC LESIONS OF SACRAL REGION, NOT ELSEWHERE CLASSIFIED
739.5	NONALLOPATHIC LESIONS OF PELVIC REGION, NOT ELSEWHERE CLASSIFIED
739.6	NONALLOPATHIC LESIONS OF LOWER EXTREMITIES, NOT ELSEWHERE CLASSIFIED
739.7	NONALLOPATHIC LESIONS OF UPPER EXTREMITIES, NOT ELSEWHERE CLASSIFIED
739.8	NONALLOPATHIC LESIONS OF RIB CAGE, NOT ELSEWHERE CLASSIFIED

754.2	CONGENITAL NEUROMUSCULOSKELETAL DEFORMITIES OF SPINE
755.69	OTHER CONGENITAL ANOMALIES OF LOWER LIMB, INCLUDING PELVIC GIRDLE
756.1	CONGENITAL ANOMALIES OF SPINE
756.11	CONGENITAL SPONDYLOLYSIS, LUMBOSACRAL REGION
756.12	SPONDYLOLISTHESIS, CONGENITAL
756.13	ABSENCE OF VERTEBRA, CONGENITAL
756.14	HEMIVERTEBRA
756.15	FUSION OF SPINE (VERTEBRA), CONGENITAL
756.16	KLIPPEL-FEIL SYNDROME
756.17	SPINA BIFIDA OCCULTA
756.19	OTHER CONGENITAL ANOMALIES OF SPINE
756.2	CERVICAL RIB

780-799	**Symptoms, Signs, and Ill-Defined Conditions**
780.4	DIZZINESS AND GIDDINESS
780.7	MALAISE AND FATIGUE
780.8	HYPERHIDROSIS
780.9	OTHER GENERAL SYMPTOMS
781	OTHER SYMPTOMS INVOLVING NERVOUS AND NEUROMUSCULOSKELETAL SYSTEMS
781.0	ABNORMAL INVOLUNTARY MOVEMENTS
781.9	OTHER SYMPTOMS INVOLVING NERVOUS AND NEUROMUSCULOSKELETAL SYSTEMS
784	SYMPTOMS INVOLVING HEAD AND NECK
784.0	HEADACHE
784.1	THROAT PAIN
786.5	CHEST PAIN
786.50	UNSPECIFIED CHEST PAIN
788.3	ENURESIS, NOCTURNAL
789.0	COLIC, INFANTILE, ABDOMINAL, INTESTINAL, SPASMODIC

800-999	**Injury**
839	DISLOCATION, NOT ELSEWHERE CLASSIFIED
839.0	DISLOCATION, CERVICAL VERTEBRA
839.00	DISLOCATION, CERVICAL VERTEBRA, CLOSED
839.01	DISLOCATION FIRST CERVICAL VERTEBRA, CLOSED
839.02	DISLOCATION SECOND CERVICAL VERTEBRA, CLOSED
839.03	DISLOCATION THIRD CERVICAL VERTEBRA, CLOSED
839.04	DISLOCATION FOURTH CERVICAL VERTEBRA, CLOSED
839.05	DISLOCATION FIFTH CERVICAL VERTEBRA, CLOSED
839.06	DISLOCATION SIXTH CERVICAL VERTEBRA, CLOSED
839.07	DISLOCATION SEVENTH CERVICAL VERTEBRA, CLOSED
839.08	DISLOCATION MULTIPLE CERVICAL VERTEBRAE, CLOSED
839.2	CLOSED DISLOCATION, THORACIC AND LUMBAR VERTEBRA
839.20	CLOSED DISLOCATION, LUMBAR VERTEBRA
839.21	CLOSED DISLOCATION, THORACIC VERTEBRA
840	SPRAINS AND STRAINS OF SHOULDER AND UPPER ARM

840.0 ACROMIOCLAVICULAR (JOINT) (LIGAMENT) SPRAIN
840.1 CORACOCLAVICULAR (LIGAMENT) SPRAIN
840.2 CORACOHUMERAL (LIGAMENT) SPRAIN
840.3 INFRASPINATUS (MUSCLE) (TENDON) SPRAIN
840.4 ROTATOR CUFF (CAPSULE) SPRAIN
840.5 SUBSCAPULARIS (MUSCLE) SPRAIN
840.6 SUPRASPINATUS (MUSCLE) (TENDON) SPRAIN
840.8 SPRAIN OF OTHER SPECIFIED SITES OF SHOULDER AND UPPER ARM
840.9 SPRAIN OF UNSPECIFIED SITE OF SHOULDER AND UPPER ARM
841 SPRAINS AND STRAINS OF ELBOW AND FOREARM
841.0 RADIAL COLLATERAL LIGAMENT SPRAIN
841.1 ULNAR COLLATERAL LIGAMENT SPRAIN
841.2 RADIOHUMERAL
841.3 ULNOHUMERAL (JOINT) SPRAIN
841.8 SPRAIN OF OTHER SPECIFIED SITES OF ELBOW AND FOREARM
841.9 SPRAIN OF UNSPECIFIED SITE OF ELBOW AND FOREARM
842 SPRAINS AND STRAINS OF WRIST AND HAND
842.0 WRIST SPRAIN
842.00 SPRAIN OF UNSPECIFIED SITE OF WRIST
842.01 SPRAIN OF CARPAL (JOINT) OF WRIST
842.02 SPRAIN OF RADIOCARPAL (JOINT) (LIGAMENT) OF WRIST
842.09 OTHER WRIST SPRAIN
842.1 HAND SPRAIN
842.10 SPRAIN OF UNSPECIFIED SITE OF HAND
842.11 SPRAIN OF CARPOMETACARPAL (JOINT) OF HAND
842.12 SPRAIN OF METACARPOPHALANGEAL (JOINT) OF HAND
842.13 SPRAIN OF INTERPHALANGEAL (JOINT) OF HAND
842.19 OTHER HAND SPRAIN
843 SPRAINS AND STRAINS OF HIP AND THIGH
843.0 ILIOFEMORAL (LIGAMENT) SPRAIN
843.8 SPRAIN OF OTHER SPECIFIED SITES OF HIP AND THIGH
843.9 SPRAIN OF UNSPECIFIED SITE OF HIP AND THIGH
844 SPRAINS AND STRAINS OF KNEE AND LEG
844.0 SPRAIN OF LATERAL COLLATERAL LIGAMENT OF KNEE
844.1 SPRAIN OF MEDIAL COLLATERAL LIGAMENT OF KNEE
844.2 SPRAIN OF CRUCIATE LIGAMENT OF KNEE
844.3 SPRAIN OF TIBIOFIBULAR (JOINT) (LIGAMENT) SUPERIOR, OF KNEE
844.8 SPRAIN OF OTHER SPECIFIED SITES OF KNEE AND LEG
844.9 SPRAIN OF UNSPECIFIED SITE OF KNEE AND LEG
845 SPRAINS AND STRAINS OF ANKLE AND FOOT
845.0 ANKLE SPRAIN
845.00 UNSPECIFIED SITE OF ANKLE SPRAIN
845.01 DELTOID (LIGAMENT), ANKLE SPRAIN
845.02 CALCANEOFIBULAR (LIGAMENT) ANKLE SPRAIN
845.03 TIBIOFIBULAR (LIGAMENT) SPRAIN, DISTAL
845.09 OTHER ANKLE SPRAIN
845.1 FOOT SPRAIN
845.10 UNSPECIFIED SITE OF FOOT SPRAIN

845.11	TARSOMETATARSAL (JOINT) (LIGAMENT) SPRAIN
845.12	METATARSOPHALANGEAL (JOINT) SPRAIN
845.13	INTERPHALANGEAL (JOINT), TOE SPRAIN
845.19	OTHER FOOT SPRAIN
846	SPRAINS AND STRAINS OF SACROILIAC REGION
846.0	LUMBOSACRAL (JOINT) (LIGAMENT) SPRAIN
846.1	SACROILIAC (LIGAMENT) SPRAIN
846.2	SACROSPINATUS (LIGAMENT) SPRAIN
846.3	SACROTUBEROUS
846.8	OTHER SPECIFIED SITES OF SACROILIAC REGION SPRAIN
846.9	UNSPECIFIED SITE OF SACROILIAC REGION SPRAIN
847	SPRAINS AND STRAINS OF OTHER AND UNSPECIFIED PARTS OF BACK
847.0	NECK SPRAIN
847.1	THORACIC SPRAIN
847.2	LUMBAR SPRAIN
847.3	SPRAIN OF SACRUM
847.4	SPRAIN OF COCCYX
847.9	SPRAIN OF UNSPECIFIED SITE OF BACK
848	OTHER AND ILL-DEFINED SPRAINS AND STRAINS
848.1	JAW SPRAIN
848.2	THYROID REGION SPRAIN
848.3	SPRAIN OF RIBS
848.4	STERNUM SPRAIN
848.42	CHONDROSTERNAL (JOINT) SPRAIN
848.5	PELVIC SPRAIN
848.8	OTHER SPECIFIED SITES OF SPRAINS AND STRAINS
848.9	UNSPECIFIED SITE OF SPRAIN AND STRAIN
850.9	CONCUSSION, UNSPECIFIED
905.7	LATE EFFECT OF SPRAIN AND STRAIN WITHOUT MENTION OF TENDON INJURY
905.8	LATE EFFECT OF TENDON INJURY
907.3	LATE EFFECT OF INJURY TO NERVE ROOT(S), SPINAL PLEXUS(ES), AND OTHER NERVES OF TRUNK
953.0	INJURY TO CERVICAL NERVE ROOT
953.1	INJURY TO DORSAL NERVE ROOT
953.2	INJURY TO LUMBAR NERVE ROOT
953.3	INJURY TO SACRAL NERVE ROOT
953.4	INJURY TO BRACHIAL PLEXUS
953.5	INJURY TO LUMBOSACRAL PLEXUS
954	INJURY TO CERVICAL SYMPATHETIC NERVE, EXCLUDING SHOULDER AND PELVIC GIRDLES
956	INJURY TO SCIATIC NERVE
959.2	OTHER AND UNSPECIFIED INJURY TO SHOULDER AND UPPER ARM
959.6	OTHER AND UNSPECIFIED INJURY TO HIP AND THIGH
959.7	OTHER AND UNSPECIFIED INJURY TO KNEE, LEG, ANKLE, AND FOOT

American Chiropractic Association

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Synopsis
Of
Efficacy & Patient Satisfaction Research

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Synopses of Chiropractic Efficacy & Patient Satisfaction Research

Bronfort G, Haas M, Evans R, Bouter L. "Efficacy of Spinal Manipulation and Mobilization for Low Back Pain and Neck Pain: A Systematic Review and Best Evidence Synthesis." *The Spine Journal* 2004; 4: 335-356.

The authors categorized 43 randomized controlled trials to assess the efficacy of Spinal Manipulative Therapy (SMT) for back and neck pain. They concluded that there are now more randomized controlled trials (46) studying the use of spinal manipulation for the management of low back pain than for any other treatment method. Overall, there was limited to moderate evidence (depending on the study) that spinal manipulative treatment of both chronic and acute lower back pain was more effective and provided more short-term relief than many other types of care, including prescription drugs, physical therapy and home exercise. There was moderate evidence that spinal mobilization was superior to physical therapy and some medical regimens for some types of neck pain. Their data synthesis suggests that recommendations can be made with some confidence regarding the use of SMT and/or mobilization as a viable option for the treatment of both low back pain and neck pain.

Descarreaux M, Blouin J, Drolet M, Papadimitriou S, Teasdale N. "Efficacy of Preventive Spinal Manipulation for Chronic Low Back Pain and Related Disabilities: A Preliminary Study." *Journal of Manipulative and Physiological Therapeutics* 2004; 27: 509-14.

Non-specific back pain patients were treated with twelve chiropractic spinal manipulations over a one-month intensive period. The patients were then divided into two groups, one group acting as a control and another receiving maintenance spinal manipulation every three weeks for nine months. Both groups improved with chiropractic care and maintained that improvement during the tenth month study. The group receiving maintenance treatment every three weeks reported better disability scores after nine months than the control group. This study appears to confirm previous reports showing that low back pain and disability scores are reduced after spinal manipulation. It also shows the positive effects of preventive chiropractic treatment in maintaining functional capacities and a reduction in the amount and intensity of pain episodes after an acute phase of treatment.

Fritz J, Whitman J, Flynn T, Wainner R, Childs J. "Factors Related to the Inability of Individuals With Low Back Pain to Improve With a Spinal Manipulation." *Physiological Therapeutics* 2004; 84: 173-190.

The authors state that many interventions used by physical therapists for management of low back pain patients lack evidence supporting their effectiveness. Although spinal manipulation is one of the few interventions for low back pain supported by evidence, it appears to be underutilized by physical therapists. The purpose of this study was to determine factors might cause an inability to benefit from manipulation. The majority of the subjects (72 percent) receiving spinal manipulation showed improvement, consistent with previous clinical trials that have shown favorable results. The physical therapists that wrote this paper support the advice of clinical practice guidelines that advocate at least a trial of manipulation for all patients with a new onset of low back pain. This work was supported by a research grant from the Foundation for Physical Therapy.

Grunnesjo M, Bogefeldt J, et al. "A Randomized Controlled Clinical Trial of Stay-Active Care versus Manual Therapy in Addition to Stay-Active Care: Functional Variables and Pain." *Journal of Manipulative and Physiological Therapeutics* 2004; 27: 431-41.

These medical researchers compared the effects of manual therapy, in addition to a stay-active concept, versus stay-active therapy only in low back pain patients. Manual therapy in low back pain has thus been found more effective than the referenced treatments in the majority of trials reviewed in preparation for this study. They found the manual therapy regime was more cost effective than the stay-active concept in acute and sub-acute low back pain patients. The manual therapy group had better pain reduction, less disability and more improvement in functional activities.

Hoiriis K, Pfleger B, McDuffie F, Cotsonis G, Elsangak O, Hinson R, Verzosa G. "A Randomized Clinical Trial Comparing Chiropractic Adjustments to Muscle Relaxants for Sub-Acute Low Back Pain." *Journal of Manipulative and Physiological Therapeutics* 2004; 27: 388-98.

These researchers compared the relative efficacy of chiropractic adjustments with muscle relaxants and placebo/sham for sub-acute low back pain (two- to six-weeks duration). They found chiropractic was more beneficial than placebo in reducing pain and more beneficial than either placebo or muscle relaxants in reducing the Global Impression of Severity Scale(GIS).

Bergman G, Winters J, Groenier K, Pool J, Meyboom-de Jong B, Postema K, Van Der Heijden G. "Manipulative Therapy in Addition to Usual Medical Care for Patients with Shoulder Dysfunction and Pain." ***Annals of Internal Medicine*** **2004; 141: 432-439.**

These medical researchers from the Netherlands studied the effectiveness of manipulative therapy for the shoulder girdle in addition to usual medical care accelerated recovery of shoulder symptoms. More patients in the manipulative therapy group than those in the medical-only group reported full recovery or very large improvements. These favorable effects were maintained during the 52-week follow-up period. They recommend that general practitioners should consider referring patients with cervicothoracic dysfunction for manual therapy.

Aure O, Nilsen J, Vasseljen O. "Manual Therapy and Exercise Therapy in Patients with Chronic Low Back Pain." ***Spine*** **2003; 28: 525-532.**

Patients complaining of lower back or radicular pain were randomized to either manual therapy or exercise for a period of two months. Both groups of patients improved with treatment, however the manual therapy group shower significantly greater improvement on both short and long- (1 year) term follow-up. The physiotherapists from Norway who designed this study also observed a considerable reduction in sick leave for the manual therapy group.

Niemisto L, Lahtinen-Suopanki T, et al. "A Randomized Trial of Combined Manipulation, Stabilizing Exercises, and Physician Consultation Compared to Physician Consultations Alone for Chronic Low Back Pain." ***Spine*** **2003; 28: 2185-2191.**

These Finnish medical researchers randomly assigned 240 chronic low back pain patients to either manipulative treatment or a medical physician consultation. The manipulative group received four weeks of physician consultation, manipulation and exercise from an experienced manual therapist, while another group received only physician consultation and an educational booklet. Outcome was measured by pain intensity and back-specific disability. Both groups improved, however the patients treated with manipulation and exercise had more reduced pain and better self-rated disability than the consultation group alone.

Giles L, Muller R. "Chronic Spinal Pain - A Randomized Clinical Trial Comparing Medication, Acupuncture and Spinal Manipulation." ***Spine*** **2003; 28: 1490-1503.**

Australian patients with chronic lower back pain of at least 13 weeks duration were randomly assigned either to medication, needle acupuncture or spinal manipulation. The results provided evidence that in patients with chronic spinal pain, manipulation results in greater short-term improvement than acupuncture or medication. The patients receiving spinal manipulation also reported a much higher full recovery rate (27%) than either those receiving acupuncture (9%) or medication (5%).

Wolsko P, Eisenberg D, Davis R, Kessler R, Phillips R. "Patterns and Perceptions of Care for Treatment of Back and Neck Pain: Results of a National Survey." ***Spine*** **2003; 28(3): 292-298.**

These medical researchers conducted a national telephone survey of 2,055 adults, asking if they had back or neck problems during the past 12 months, and if yes, what type of treatment was received and how helpful was it. 33 percent of those surveyed reported having back or neck pain during the last year; 20 percent sought chiropractic care. Chiropractic providers were perceived as having been "very helpful " for back or neck pain in 61 percent of the cases, in contrast to only 27 percent who perceived their medical care as being "very helpful." When the patients who had pain in more than one area were surveyed, their preference for chiropractic was unquestionable. 72 percent of those treated by a chiropractor reported the treatment as "very helpful," compared to only 19 percent of those who had seen conventional providers.

George B. McClelland, D.C., Testimony to the Department of Veterans Affairs' Chiropractic Advisory Committee; Foundation for Chiropractic Education and Research: March 25, 2003.
http://www.chiro.org/LINKS/ABSTRACTS/Testimony_to_the_Department_of_Veterans_Affairs.html

American Chiropractic Association report to the Veteran Administration; American Chiropractic Association: 1999. www.amerchiro.org/pdf/va_report.pdf

Hertzman-Miller R, Morgenstern H, Hurwitz E, et al. "Comparing the Satisfaction of Low Back Pain Patients Randomized to Receive Medical or Chiropractic Care: Results From the UCLA Low Back Pain Study." *American Journal of Public Health* 2002; 92: 1628-1633.

Approximately one third as many back pain patients seek chiropractic care compared to those who seek medical care. The physician community is taking note of the chiropractors' ability to treat lower back pain and their high patient satisfaction. In earlier randomized clinical trials, investigators found spinal manipulation to have similar or better rates of patient satisfaction when compared to medical approaches like physical therapy, McKenzie method and standard medical therapy. This study examined the differences in satisfaction between patients assigned to either medical care or chiropractic care in a managed care organization. In this randomized trial, the chiropractic patients were more satisfied with their back care after 4 weeks of treatment. One possible explanation is that the self-care advice and explanation of treatment had strong effects on patient satisfaction. They also point out that chiropractors might give more detailed physical examinations than do medical providers. They conclude that providers in managed care organizations might be able to increase the satisfaction of their low back pain patients by communicating advice and information to patients about their condition and treatment.

Hoving J, Koes B, De Vet H, Van Der Windt D, Assendelft W, Van Mameren H, Deville W, Pool J, Scholten R, Bouter L . "Manual Therapy, Physical Therapy or Continued Care by a General Practitioner for Patients with Neck Pain." *Annals of Internal Medicine* 2002; 136: 713-7220.

In a randomized, controlled trial, researchers compared the effectiveness of manual therapy, physical therapy (PT) and continued care by a general practitioner (GP) in patients with nonspecific neck pain. The success rate at seven weeks was twice as high for the manual therapy group (68.3 percent) as for the continued care group (general practitioner). Manual therapy scored better than physical therapy on all outcome measures. Additionally, patients receiving manual therapy had fewer absences from work than patients receiving physical therapy or continued care. The magnitude of the differences between manual therapy and the other treatments (PT or GP) was most pronounced for perceived recovery. Because perceived recovery combines other outcomes, such as pain, disability and patient satisfaction, it may be the most responsive outcome measure.

Hawk C, Long CR, Boulanger KT. "Patient Satisfaction with the Chiropractic Clinical Encounter: Report from a Practice-Based Research Program." *Journal of the Neuromusculoskeletal System* 2001; 9(4): 109-117.

When 2,987 patients from a variety of rural and urban locations in the United States and Canada completed a data collection survey, 85 percent stated, "Their chiropractor always listened carefully." 85.3 percent stated, "The chiropractor explained things understandably." 88.2 percent stated, "The chiropractor showed respect for what they had to say." Overall, the majority of patients were highly satisfied with their care.

Gemmell HA, Hayes BM. "Patient Satisfaction with Chiropractic Physicians in an Independent Physicians Association." *Journal of Manipulative and Physiological Therapeutics* 2001; 24(9): 556-559.

In this study, 150 chiropractic patients were surveyed. Chiropractic care received "excellent" remarks by percentage, in the following categories: Time to Get an Appointment – 84.9 percent; Convenience of Office - 57.7 percent; Access to Office by Phone - 77.3 percent; Length of Wait - 75.7 percent; Time Spent with Provider - 74.3 percent; Explanation of Treatment - 72.8 percent; Skill of Provider - 83.3 percent; Personal Manner of the Chiropractor - 92.4 percent. The "Overall Visit" category was given the "excellent" response by 83.3 percent of those surveyed.

Nyiendo J, Haas M, Goodwin P. "Patient characteristics, practice activities, and one-month outcomes for chronic, recurrent low-back pain treated by chiropractors and family medicine physicians: a practice-based feasibility study." *Journal of Manipulative and Physiological Therapeutics* 2000; 23: 239-45.

Patients with chronic (>6 weeks), recurrent lower back pain were treated by either a private chiropractor or a family medicine clinic. After one month of treatment, chiropractic patients averaged higher improvement across all outcome measurements. The differences between provider groups were most marked for the question involving satisfaction with overall care (chiropractic-90%; medical–52%). Chiropractic patients also reported greater improvement and in pain severity and functional disability. This study concluded that chiropractic patients expressed greater satisfaction regarding information and treatment provided.

Burton AK, Tillotson KM, Cleary J. "Single-blind randomized controlled trial of chemonucleolysis and manipulation in the treatment of symptomatic lumbar disc herniation." ***European Spine Journal*** **2000; 9: 202-207.**

Forty patients with confirmed sciatica were treated with either osteopathic manipulation treatment or chemonucleolysis. The pain endured by the patient was measured at 2 weeks, 6 weeks and one year. After a year patients from both groups were very similar in recovery. However, at 2 and 6 weeks those receiving manipulations reported greater improvement.

Giles L, Muller R. "Chronic Spinal Pain Syndrome: A Clinical Pilot Trial Comparing Acupuncture, a Non-Steroidal Anti-Inflammatory Drug and Spinal Manipulation." ***Journal of Manipulative and Physiological Therapeutics*** **1999; 22: 376-81.**

Patients referred to Townsville General Hospital outpatient Spinal Pain Unit in Australia for evaluation and treatment of chronic (>13 weeks) spinal pain were randomized to acupuncture, medication or spinal manipulation. After 30 days of treatment only the manipulation subgroup showed significant reduction in pain intensity. Remarkably, the manipulation group displayed uniform, significant, substantial improvements across all outcome measurements while in the two other intervention groups not a single significant improvement could be found.

Davis TP, Hulbert JR, Kassem KM, Meyer JJ. "Comparative Efficacy of Conservative Medical and Chiropractic Treatments for Carpal Tunnel Syndrome: A Randomized Clinical Trial" ***Journal of Manipulative and Physiological Therapeutics*** **1998; 21(5): 317-326.**

This study sought to compare the effects of chiropractic care and conventional medical care for managing carpal tunnel syndrome. 91 patients with confirmed symptoms of carpal tunnel syndrome were divided into two groups. One group received decreasing amounts of ibuprofen over three weeks. The other group received manipulation of bony joints and soft tissues of the upper extremities and spine. The patients' improvement was monitored through self-reports and analyses of the vibrometric sensibility of the hands. There was improvement in comfort, finger sensation and nerve conduction in both groups. For right hands affected by carpal tunnel the group who received medical care improved by 1.37 decibels according to the vibrometric tests. Those receiving chiropractic care improved by 3.05 decibels.

Nilsson N, Christensen HW, Harvigsen J. "The Effect of Spinal Manipulation in the Treatment of Cervicogenic Headache." ***Journal of Manipulative and Physiological Therapeutics*** **1997; 20(5): 326-330.**

Of 53 individuals who were diagnosed with cervicogenic headaches, 28 individuals in the group received high-speed, low-amplitude spinal manipulation in the cervical spine two times a week for three weeks. The rest of the group received low-level laser to the upper cervical region and deep-friction massage in the lower cervical/upper thoracic region two times a week for three weeks. For those who received spinal manipulation treatment, the amount of headache hours per day decreased 69 percent; for those receiving laser treatment, the decrease was only 37 percent. Intensity of headache decreased 36 percent for those receiving manipulations and 17 percent for those receiving laser treatment. The use of pain relievers went down 36 percent for those receiving manipulations and was unchanged for those receiving laser treatment.

Meade TW, Dyer S, et al. "Randomized Comparison of Chiropractic and Hospital Outpatient Management for Low Back Pain: Results from Extended Follow Up." ***British Medical Journal*** **Aug 1995, Vol. 311.**

741 patients were randomly allocated to either chiropractic or hospital outpatient management. A 1990 study by these researchers reported greater improvement in patients with low back pain treated by chiropractors. This paper looks at data after a three-year follow-up. According to total Oswestry scores, improvement in chiropractic patients was 29 percent more than those treated by hospitals. The beneficial effect of chiropractic on pain was particularly clear. Other scores (personal care, lifting, walking, standing, sex life, social life and traveling) also nearly all improved more in the

patients treated with chiropractic care. The substantial benefit of chiropractic on intensity of pain is evident early on and then persists. A higher proportions of patients considered chiropractic care helpful in comparison with hospital treatments. The results show that chiropractic has a valuable part to play in the management of low back pain.

Boline PD, Kassem K, Bronfort G, Nelson C, Anderson A. "Spinal Manipulation vs. Amitriptyline for the Treatment of Chronic Tension-Type Headaches: A Randomized Clinical Trial." ***Journal of Manipulative and Physiological Therapeutics*** **1995; 18(3): 148-154.**

This study compared the effects of spinal manipulation and pharmaceutical treatments for chronic tension headaches. Four weeks following the cessation of treatment, the pharmaceutical group demonstrated no improvement from the baseline. In the spinal manipulation group, headache intensity dropped 32 percent; frequency dropped 42 percent; and there was an overall improvement of 16 percent in functional health status.

Carey TS, Garrett J, Jackman A, McLaughlin C, Fryer J, Smucker DR. "The outcomes and costs of care for acute low back pain among patients seen by primary care practitioners, chiropractors, and orthopedic surgeons. The North Carolina Back Pain Project." ***New England Journal of Medicine*** **1995; 333(14): 913-917.**

This study sought to compare patients' recovery and satisfaction for those with acute low back pain receiving care from the following six groups: Urban Primary Care Physicians; Rural Primary Care Physicians; Urban Doctors of Chiropractic (DCs); Rural DCs; Orthopedic Surgeons; and Primary Care Providers at a Group Model HMO. After six months, functional recoveries, return to work and complete back pain recoveries were similar for all groups. Satisfaction with care was highest for those visiting DCs.

Manga, Pran; Angus, Doug; Papadopoulos, Costa; Swan, William. "The Effectiveness and Cost-Effectiveness of Chiropractic Management of Low-Back Pain." Richmond Hill, Ontario: Kenilworth Publishing, 1993.

A major study to assess the most appropriate use of available health care resources was reported in 1993 by the Ontario Ministry of Health. The report overwhelmingly supported the efficacy, safety, scientific validity and cost-effectiveness of chiropractic for low back pain. "There is no clinical or case-control study that demonstrates or even implies that chiropractic spinal manipulation is unsafe in the treatment of low back pain. Some medical treatments are equally safe, but others are unsafe and generate iatrogenic complications for low back pain patients. The literature suggests that chiropractic manipulation is safer than medical management of low back pain. There is an overwhelming body of evidence indicating that chiropractic management of low back pain is more cost effective than medical management. The evidence includes studies showing lower chiropractic costs for the same diagnosis and episodic need for care. There is good empirical evidence that patients are very satisfied with chiropractic management of low back pain and considerably less satisfied with physician management. Patient satisfaction is an important health outcome indicator and adds further weight to the clinical and health economic results favoring chiropractic management of low back pain."

Sawyer CE, Kassak K. "Patient Satisfaction With Chiropractic Care" ***Journal of Manipulative and Physiological Therapeutics*** **1993; 16(1): 25-32.**

341 new and returning chiropractic patients in Minnesota and Wisconsin completed a patient satisfaction questionnaire. Overall, patients demonstrated a high level of satisfaction with their doctors of chiropractic. 84% of respondents felt their chiropractic care was "just about perfect." 97% agreed or strongly agreed that they would "recommend this doctor to a friend or relative."

Meade TW, Dyer S, Browne W, Townsend J, Frank AO. "Low Back Pain of Mechanical Origin: Randomized Comparison of Chiropractic and Hospital Outpatient Treatment." ***British Medical Journal*** **1990; 300(2): 1431-1437.**

741 patients, who had neither been treated in the past month nor had contraindications to spinal manipulation, were treated either by doctors of chiropractic or with conventional hospital outpatient treatment for management of low back pain. Using the Oswestry scale, which quantifies pain, patients reported back on their improvement at six weeks, six months, one year and two years. At two years, chiropractic care resulted in a 7 percent benefit over hospital care.

Cherkin, D., MacCornack, F. "Chiropractic in the Mainstream: Patient Evaluations of Care from Family Physicians and Chiropractors." ***Western Journal of Medicine*** **March 1989.**

This survey show that patients of chiropractors were three times as likely as patients of family physicians to respond that they were satisfied with the care they received for low back pain. Chiropractic patients were also more likely to have been satisfied with the amount of information they were given and to believe their doctors were concerned about them. This study was conducted at the Group Health Cooperative of Puget Sound, a 40-year-old staff-model Health Maintenance Organization (HMO) in western Washington State with 32,000 enrollees. The percentage of chiropractic patients who were “very satisfied” with the care they received for low back pain was triple that for patients of family physicians (66 percent versus 22 percent). Patients of family physicians were significantly less likely to report having received a graphic description of the causes of low back pain or instruction on exercise, posture and lifting techniques.

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Back Pain Facts & Statistics

Although chiropractors care for more than just back pain, many patients visit chiropractors looking for relief from this pervasive condition. In fact, 31 million Americans experience low-back pain at any given time.[1]

A few interesting facts on this condition:

- One-half of all working Americans admit to having back pain symptoms each year.[2]
- Back pain is one of the most common reasons for missed work. In fact, back pain is the second most common reason for visits to the doctor's office, outnumbered only by upper-respiratory infections.
- Most cases of back pain are mechanical or non-organic—meaning they are not caused by serious conditions, such as inflammatory arthritis, infection, fracture or cancer.
- Americans spend at least $50 Billion each year on back pain—and that's just for the more easily identified costs.[3]
- Experts estimate that as many as 80% of the population will experience a back problem at some time in our lives.[4]

What Causes Back Pain?

The back is a complicated structure of bones, joints, ligaments and muscles. You can sprain ligaments, strain muscles, rupture disks, and irritate joints, all of which can lead to back pain. While sports injuries or accidents can cause back pain, sometimes the simplest of movements—for example, picking up a pencil from the floor— can have painful results. In addition, arthritis, poor posture, obesity, and psychological stress can cause or complicate back pain. Back pain can also directly result from disease of the internal organs, such as kidney stones, kidney infections, blood clots, or bone loss.

Manipulation as a Treatment for Back Problems

Used primarily by Doctors of Chiropractic (DCs) for the last century, manipulation has been largely ignored by most others in the health care community until recently. Now, with today's growing emphasis on treatment and cost effectiveness, manipulation is receiving more widespread attention.

Chiropractic spinal manipulation is a safe and effective spine pain treatment. It reduces pain, decreases medication, rapidly advances physical therapy, and requires very few passive forms of treatment, such as bed rest.[5]

In fact, after an extensive study of all currently available care for low back problems, the Agency for Health Care Policy and Research--a federal government research organization—recommended that low back pain suffers choose the most conservative care first. And it recommended spinal manipulation as the only safe and effective, drugless form of initial professional treatment for acute low back problems in adults.[6]

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The American Chiropractic Association (ACA) urges you to make an informed choice about your back care. To learn more about how chiropractic manipulation may help you, contact a Doctor of Chiropractic in your area. Search our online database of ACA members to find a doctor of chiropractic near you.

Tips to Prevent Back Pain

- Maintain a healthy diet and weight.
- Remain active—under the supervision of your doctor of chiropractic.
- Avoid prolonged inactivity or bed rest.
- Warm up or stretch before exercising or other physical activities, such as gardening.
- Maintain proper posture.
- Wear comfortable, low-heeled shoes.
- Sleep on a mattress of medium firmness to minimize any curve in your spine.
- Lift with your knees, keep the object close to your body, and do not twist when lifting.
- Quit smoking. Smoking impairs blood flow, resulting in oxygen and nutrient deprivation to spinal tissues.
- Work with your doctor of chiropractic to ensure that your workstation is ergonomically correct.

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1. Jensen M, Brant-Zawadzki M, Obuchowski N, et al. Magnetic Resonance Imaging of the Lumbar Spine in People Without Back Pain. N Engl J Med 1994; 331: 69-116.

2. Vallfors B. Acute, Subacute and Chronic Low Back Pain: Clinical Symptoms, Absenteeism and Working Environment. Scan J Rehab Med Suppl 1985; 11: 1-98.

3. This total represents only the more readily identifiable costs for medical care, workers compensation payments and time lost from work. It does not include costs associated with lost personal income due to acquired physical limitation resulting from a back problem and lost employer productivity due to employee medical absence. In Project Briefs: Back Pain Patient Outcomes Assessment Team (BOAT). In MEDTEP Update, Vol. 1 Issue 1, Agency for Health Care Policy and Research, Rockville, MD, Summer 1994.

4. In Vallfors B, previously cited.

5. Time to recognize value of chiropractic care? Science and patient satisfaction surveys cite usefulness of spinal manipulation. Orthopedics Today 2003 Feb; 23(2):14-15.

6. Bigos S, Bowyer O, Braen G, et al. Acute Low Back Problems in Adults. Clinical Practice Guideline No.14. AHCPR Publication No. 95-0642. Rockville, MD: Agency for Health Care Policy and Research, Public Health Service, U.S. Department of Health and Human Services, December, 1994.

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Research & Science

Original Contribution

Chiropractic Care for Older Adults at Risk for Falls: A Preliminary Assessment

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ABSTRACT

Objective: to make a preliminary assessment of the possible effect of chiropractic spinal manipulative therapy (SMT) on risk of falls in older adults.

Study design: single-group pre-test/post-test intervention.

Intervention: 6-9 high-velocity, low-amplitude SMT treatments over a 3-week period by an experienced doctor of chiropractic.

Outcomes assessments: risk of falls was assessed using the Berg Balance Scale (BBS); BBS scores of 45 or less are predictive of increased risk of falling. Additional assessments of balance-related symptoms were the One-Leg Standing Test (OLST) and the Dizziness Handicap Inventory.

Results: Of 108 patients screened, 14 were enrolled and 13 completed the study. Six of 7 patients with baseline BBS scores of 45 or less had follow-up scores higher than 45.

Conclusion: Although this study was limited by its small sample size and absence of a comparison group, the change in patients' fall risk pre- to post-intervention warrants further investigation of a possible role of SMT in fall prevention in older adults.

Key words: Chiropractic, aged, balance, equilibrium, assessment

INTRODUCTION

Falls are an important public health issue and a relevant consideration for providers of care to older adults. Annually, about one-third of community-dwelling adults aged 65 and older experience a fall, and of those, 50% will experience an additional fall in the same year. Of all deaths due to unintentional injury in older adults, two-thirds are due to falls.[1] Total U.S. annual costs attributed to falls total $75-100 billion.[1,2]

Risk factors for falls in older adults include certain medications and medication interactions related to

polypharmacy, environmental hazards, poor vision, lower extremity impairments, and impairments in balance.[1-3]

At this time, there is very little research examining a possible relationship between chiropractic spinal manipulative therapy (SMT) and fall prevention.[4-6] This study was designed to make a preliminary assessment of the possible effect of chiropractic SMT on risk of falls in community-dwelling older adults.

MATERIALS AND METHODS

This was a single-group intervention with a pre-test/post-test design conducted at the Parker Research Institute in Dallas, Texas. The study's specific aims were to:

1. Assess the feasibility of recruiting patients for a larger controlled clinical study of the effect of chiropractic care on balance problems in older adults.
2. Describe characteristics of patients recruited in terms of health habits and health history.
3. Assess the utility of the Berg Balance Scale (BBS) as an outcome measure in a population of community-dwelling older adults.
4. Observe patients' risk of falls as assessed by BBS scores and balance-related symptoms before and after a brief trial of chiropractic spinal manipulation.

Study Population

Eligibility Criteria

Inclusion criteria

1) Aged 60 or older
2) Self-report of experiencing dizziness, lightheadedness or unsteadiness at least 3 times in an average week.
3) Unable to stand steadily without assistance on 1 leg for more than 5 seconds.

Exclusion criteria

1) Wheelchair-bound; this precluded balance testing.
2) Received chiropractic care within the past 6 months (by self report).
3) Concurrently beginning (within last month) an exercise program targeting balance and/or lower-body strength
4) Concurrently receiving physical therapy or other manual therapeutic treatment for balance
5) Contraindications to chiropractic adjustments, as determined by the clinician through physical exam and x-rays (if indicated).
6) Absence of indications for chiropractic adjustments, as determined by the clinician through physical exam, palpation and x-rays (if indicated).

Human Subjects Issues and Informed Consent

The study was approved by the college's Institutional Review Board prior to recruitment. The study was open to all eligible volunteers, regardless of sex, ethnicity or cultural background. Non-English-speaking participants were enrolled if they were accompanied by an English-speaking interpreter. All enrolled patients who completed, at a minimum, the first visit and the follow-up visit were compensated for their time and travel in the amount of $50, paid as a check at the conclusion of the follow-up visit. Patients' confidentiality was protected by secure storage of data in a password-protected computer and reporting of results in group form only. Screening for contraindications for chiropractic care prior to enrollment maximized patients' safety.

Recruitment

Patients from a previous study that did not involve hands-on treatment were encouraged to participate if eligible. Additional recruitment was done through presentations at local senior centers and health fairs, both of which included balance testing using the One-Leg Standing Test (OLST). We also placed ads in a widely distributed senior newspaper.

Study Period, Treatment Frequency and Duration

The study period was 3 weeks, during which patients were to be scheduled for 2-3 visits per week for treatment, for a total of 6-9 treatment visits. Frequency within the 6-9 visit limitation was determined by the clinician's assessment of patient need. Each visit was scheduled to last 10-15 minutes. At the last visit of the study, no treatment was administered; patients completed follow-up questionnaires and assessments.

Intervention
Chiropractic care was limited to high-velocity, low-amplitude adjustments to the spine, using Diversified technique. Adjustments were delivered to as many segments as clinically indicated by static and motion palpation and a thorough assessment of the patient by the clinician, a licensed doctor of chiropractic with 11 years of experience. Physical modalities were not used, and no exercises were prescribed.

Assessment
The purpose of the assessment was to 1) describe the sample in terms of demographics, history of falls, and presence of risk factors for falls and balance-related factors; 2) evaluate participants' balance-related symptoms at baseline and at the final visit after completion of 3 weeks of chiropractic care.

Baseline visit
1. Demographic information, health status (from the Behavioral Risk Factor Surveillance System[7]) and health habits
2. Health history, including;
- Self-report of feeling of dizziness, lightheadedness or unsteadiness (categorized as 3 or more times per week, 1-2 times per week; less than 1 time per week)
- Medical history
- History of falls
- Medication use (participants were asked to bring all their medications with them so a research assistant could make a record of them)

3. Physical examination (performed by a licensed DC or by a chiropractic intern under the direct supervision of a licensed DC)
- Vital signs, orthopedic and neurological exam
- X-rays if indicated

Both baseline and follow-up visit:
1. Balance assessment
a) The Berg Balance Scale (BBS) is a functional test in which the patient performs actions involved in everyday activities, such as picking up an object or moving from a sitting to a standing position. Its 14 items are scored on a 5-point ordinal scale, with 0 indicating inability to perform the action and 4 indicating independence.[8] The BBS is used extensively in assessing the balance of both nursing home and community-dwelling elderly. Its reliability and validity have been well documented, and it has been shown to be capable of predicting falls among community-dwelling adults.[9,10] A score of 45 or less is used by most investigators to indicate a greater risk for falls.[11-13] Our research assistants had been previously trained to administer the BBS according to standard protocols and were experienced in administering it in a previous study with 101 patients.
b) The One-Leg Standing Test (OLST) is in wide use among physical therapists and occupational therapists as an assessment of postural stability. The examiner records the number of seconds the patient is able to stand unaided on one leg, either with eyes open or eyes closed, and then the test is repeated with the other leg. The OLST has been documented to have adequate reliability when used with adults.[14] It may also be useful as a predictor of functional decline, and it is sensitive to clinical change.[15-16]
c) Dizziness Handicap Inventory. The Dizziness Handicap Inventory (DHI) is a 25-item self-assessment scale with scores ranging from 0 (no handicap) to 100 (significant perceived handicap). Scores are highly correlated with platform posturography. The DHI has been shown to be valid, reliable and sensitive to clinical change.[17]

Data Collection and Assessment
Data were collected directly from patients by self-report on questionnaires or from forms completed by the Research Assistants (RA) recording patient interview data or results of physical assessments and examinations. Medication use was recorded by the RA by transcribing information directly from patients' medications, which they were asked to bring with them at the intake visit. All data collection forms were modified from forms used in previous studies.

Data Management and Analysis
The data manager reviewed forms for completeness and multiple responses; coded responses and prepared data dictionaries and keys; prepared forms for data entry; and ran validation checks after key entry was performed. Forms were stored in a secure cabinet and only data entry personnel had access to them. Data were entered into an SPSS (Version 12.0 for Windows) database. De-

scriptive statistics were computed on variables of interest. Due to the small, non-random sample, we did not use inferential statistics. Instead, BBS, OLST and DHI scores were compared on a case-by-case basis at baseline and at the final follow-up visit.

RESULTS

Recruitment and enrollment

A total of 108 people were screened, 93 off-site at health fairs and senior centers and 15 on-site in response to newspaper ads and family member referrals. The OLST, which we used as part of the screening process, proved to be very popular with older adults at both senior centers and health fairs. Figure 1 shows the results of recruitment. Of the 108 people screened, 71 were eligible and 14 subsequently enrolled in the study. The most common reasons eligible patients did not enroll in the study were related to scheduling and transportation (39).

A change in the treating DC's schedule limited his availability to provide treatment to 2 days per week, so all patients received a maximum of 6 treatment visits. Thirteen of 14 patients completed the study. The patient who dropped out did so due to incompatibility with the doctor's limited schedule.

Sample Characteristics

The demographics of the 14 eligible patients are shown in Table 1; most were female,[9] white,[9] living alone,[10] and educated at less than the college degree level.[8]

With respect to current symptoms and conditions patients reported experiencing within the last month, 10 or more reported the following: dizziness, arthritis, low-back pain, general joint pain and stiffness, muscle aches, and lower-extremity pain. All but one were currently under the care of a medical physician. Three reported that they did no regular exercise, and 3 reported being current tobacco users. All 14 patients were currently taking at least 1 prescription medication, with the median being 3.5 medications. The most common class of medications used was for blood pressure control, with 7 patients using medications in this category. Four patients were taking prescription pain medications for musculoskeletal pain; 2 of these also reported use of non-prescription pain medication, and one patient used only non-prescription pain medication.

Balance and Dizziness

Table 2 shows the baseline and follow-up scores for the BBS, DHI and OLST for all 14 patients. Six of the 7 patients with baseline BBS scores of 45 or less had follow-up scores higher than 45. The patient who didn't achieve a 45 also demonstrated an improvement in BBS score (34 to 42). Six of the 7 patients with baseline BBS scores of 45 or less showed an improvement in their DHI scores at follow-up.

DISCUSSION

One aim of this study was to assess the feasibility of recruiting patients with balance problems into a larger study involving provision of chiropractic care. In the current study, the lack of a full-time clinician placed a significant limitation on scheduling, and also may have affected treatment outcomes, since all patients were restricted to only 2 treatment visits per week. The optimal frequency and number of chiropractic visits for patients with balance-related symptoms, however, is currently unknown.

From our results, it appears that giving presentations at senior centers and offering booths with balance testing at health fairs are useful recruitment methods, and that it is important to provide flexible scheduling and assist patients with transportation to recruit larger numbers of eligible patients.

This study provides preliminary information on use of the BBS, DHI and OLST as possible screening and/or outcome measures in assessing balance in ambulatory older adults. We used the OLST as a screening measure for inclusion in the study; however, a OLST score of less than 5 seconds, with eyes open, did not appear to accurately identify patients at risk for fall, as determined by the BBS. Future studies should weigh the ease of administration of the OLST against the more time-consuming BBS. Measures of dizziness, such as the DHI, may have utility in differentiating subgroups of patients with dizziness-related balance deficits from those with deficits attributable to musculoskeletal problems (pain, muscle weakness and/or joint stiffness). In our results, the DHI did

not appear to bear a consistent relationship to the BBS, although for most patients, DHI scores also improved from baseline to follow-up.

We must consider a number of limitations of this preliminary study before attempting to interpret its outcomes. Most important, the absence of a comparison group makes it impossible to conclude that the improvements in the follow-up balance test scores can be attributed to the intervention. Since all patients knew they were participating in a balance study, their improvement may be due to a belief that the treatment would help, or it might have been simply a learning effect from performing the tests the 2nd time. In our earlier study with 94 patients in which patients did not receive hands-on treatment, however, the mean improvement for all patients on the BBS was only 1.7 points, and 4.5 for the subset of 32 patients with a baseline BBS score lower than 45.[18] This might suggest a greater effect in the current study where chiropractic SMT was provided; or it might also represent regression to the mean.

An additional limitation of a single-group intervention when performance tests must be scored by examiners is the lack of blinding, since examiners were aware that patients had received a course of treatment. Even given these limitations, it is important to note that 6 of 7 patients whose baseline BBS scores were in the category of increased risk for fall (< 46) had follow-up scores above that cut-off point. This represents a significant risk factor reduction. Due to the small sample size and lack of a comparison group, we cannot attribute this improvement to chiropractic SMT. There are, however, considerable public health implications for any intervention that might contribute to reduction in this important cause of death and disability. It is important, therefore, to conduct larger, more controlled studies to identify which, if any, of the various factors present in this study might have contributed to these observed improvements, and whether or not such improvements are transient phenomena. ■

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Figure 1. Study enrollment

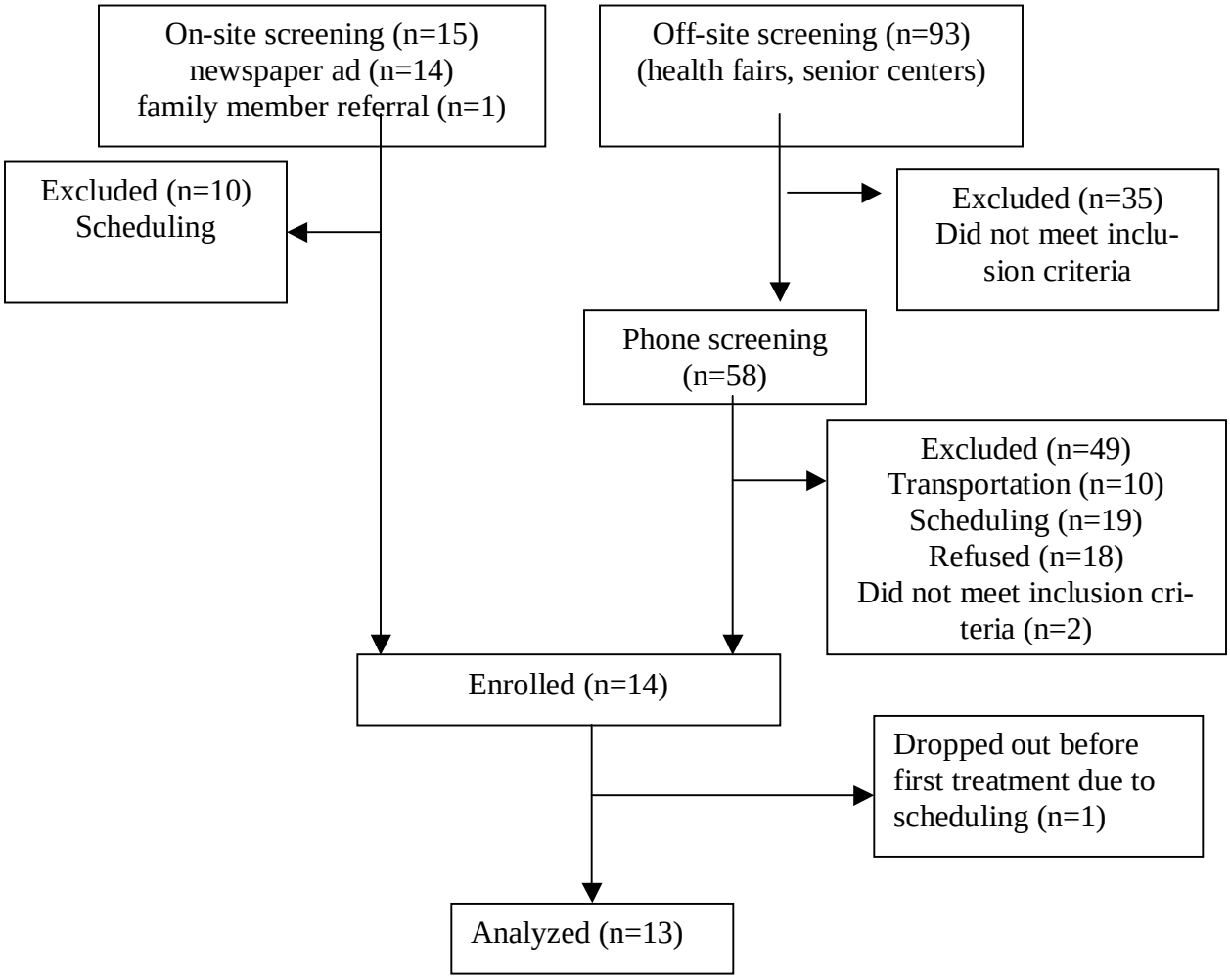

Table 1. Patient baseline characteristics (n=14).*

Characteristic	Number of patients
Sex	
Female	9
Male	4
Mean age in years	71.4
Marital status	
Married or living with partner	4
Widow/widower living alone	5
Single/divorced living alone	5
Race/ethnicity	
White	9
Black/African American	4
Asian/Pacific Islander	1
Educational level	
Did not complete high school	3
High school diploma	2
Some college	3
College degree	2
Post-graduate degree	2
Professional school	2
Employment	
Employed part-time	3
Retired	11
Depression screeners (concerning past 2 weeks)	
Felt down, depressed or hopeless	6
Felt little interest or pleasure in doing things	5
Have trouble sleeping	9
BRFSS questions:	
"During the past 30 days, for about how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work, or recreation?"	6 (mean) 1 (median) 0,21 (range)
"During the past 30 days, for about how many days have you felt very healthy and full of energy?"	16 (mean) 18 (median) 0,30 (range)

* Actual numbers rather than proportions are shown due to small sample size.

Table 2. Comparison of BBS and DHI baseline and follow-up scores for all patients, ordered by baseline BBS score (n=14).

	BBS[1]		DHI[2]		OLST[1]			
ID #					R		L	
	Baseline	Follow-up	Baseline	Follow-up	Baseline	Follow-up	Baseline	Follow-up
02	52	56	34	36	4	11	4	36
09	51	--	26	--	11	--	9	--
07	50	49	16	24	4	31	2	2
08	50	49	84	76	1	3	2	4
13	50	54	14	12	3	17	13	17
06	47	48	28	28	1	1	1	1
11	46	53	8	0	9	5	2	3
BBS baseline scores below indicate increased risk for falls.								
05	44	52*	6	8	2	9	2	3
14	39	46*	42	34	1	3	1	3
04	38	48*	56	50	1	6	2	5
10	37	52*	56	32	4	7	2	13
03	36	46*	60	46	1	4	1	2
12	34	42	59	54	0	1	0	1
01	27	49*	88	52	2	5	1	3

[1] BBS and OLST: higher scores indicate increased function.
[2] DHI: higher scores indicate decreased function (increased handicap).
* Indicates baseline score *within* category for risk for fall and follow-up score *above* risk for fall cut-off point.

The Management of Chronic Pain in Older Persons

AGS Panel on Chronic Pain in Older Persons

BACKGROUND AND SIGNIFICANCE

Pain is an unpleasant sensory and emotional experience.[1] It is recognized as a complex phenomenon derived from sensory stimuli and modified by individual memory, expectations, and emotions.[2] Unfortunately, there are no objective biological markers of pain. Therefore, the most accurate evidence of pain and its intensity is based on the patient's description and self-report.[3]

A concise definition of chronic pain remains difficult. For some conditions, chronic pain is defined as pain that exists beyond an expected time frame for healing. For other conditions, it is well recognized that healing may never occur. In many cases, chronic pain is understood as persistent pain that is not amenable to routine pain control methods.[1] Because there are many differences in what may be regarded as chronic pain, the definition remains flexible and related to specific diagnoses or cases. (For a more detailed description, see the classification of chronic pain of the International Association for Study of Pain[1]).

Chronic pain is common in older people.[4,5] A recent Louis Harris telephone survey found that one in five older Americans (18%) are taking analgesic medications regularly (several times a week or more), and 63% of those had taken prescription pain medications for more than 6 months.[6] Older people are more likely to suffer from arthritis, bone and joint disorders, back problems, and many other chronic conditions. This survey also found that 45% of patients who take pain medications regularly had seen three or more doctors for pain in the past 5 years, 79% of whom were primary care physicians. Previous studies have suggested that 25 to 50% of community-dwelling older people suffer important pain problems.[7–12] Pain is also common in nursing homes.[13] It has been estimated that 45 to 80% of nursing home residents have substantial pain that is undertreated.[14–16] Studies of both the ambulatory and nursing home populations have found that older people often have several sources of pain. This finding is not surprising inasmuch as older patients often have multiple medical problems. A high prevalence of dementia, sensory impairments, and disability in this population make assessment and management difficult.

The consequences of chronic pain among older people are numerous. Depression,[11,15,17,18] decreased socialization,[11,15] sleep disturbance,[11,14] impaired ambulation,[11,14,19] and increased healthcare utilization and costs[19] have all been associated with the presence of pain in older people. Although less thoroughly described, many other conditions are potentially worsened by the presence of pain, including gait disturbances, slow rehabilitation, and adverse effects from multiple drug prescriptions.

Psychosocial factors are known to be associated with pain in older patients. Keefe et al. (1987) have shown that older adults with good coping strategies have significantly lower pain and psychological disability.[20] Depression is often associated with pain in the older patient. Parmelee et al. (1991) showed a statistically significant correlation between pain and depression among nursing home residents even after controlling for self-reported functional status and physical health.[18] Older patients with cancer pain rely heavily on family and informal caregivers.[21] For these patients and caregivers, pain can be a metaphor for death, resulting in substantial suffering.[22]

Classifying chronic pain in pathophysiologic terms may help the clinician select therapy and determine prognosis.[23] Treatment strategies targeted specifically to underlying pain mechanisms are likely to be most effective. Although it is beyond the scope of this guideline to describe the pathophysiology of individual pain syndromes in detail, most syndromes can be classified into four basic categories. This classification system, with examples, is shown in Table 1. Nociceptive pain may be visceral or somatic and is most often derived from stimulation of pain receptors.[24] Nociceptive pain may arise from tissue inflammation, mechanical deformation, ongoing injury, or destruction. Examples include inflammatory or traumatic arthritis, myofascial pain syndromes, and ischemic disorders. Nociceptive mechanisms usually respond well to traditional approaches to pain management, including common analgesic medications and nonpharmacologic strategies. Neuropathic pain results from a pathophysiologic process that involves the peripheral or central nervous system.[25] Examples include trigeminal neuralgia, post-herpetic neuralgia, poststroke central or thalamic pain, and postamputation phantom limb pain. These pain syndromes do not respond as predictably as nociceptic pain problems to conventional analgesic therapy. However, they have been noted to respond to unconventional analgesic drugs such as tricyclic antidepressants, anticonvulsants, or anti-arrhythmic drugs.[26] Mixed or unspecified pain is often regarded as having mixed or unknown mechanisms. Examples include recurrent headaches and some vasculitic pain syndromes. Treatment of these syndromes is more unpredictable and may require various trials of different or combined approaches. Finally, when psychological factors are judged to have a major role in the onset, severity, exacerbation, or

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0002-8614/0/$3.50

Table 1. Pathophysiologic Classification of Chronic Pain

Nociceptive pain
Arthropathies (e.g., rheumatoid arthritis, Osteoarthritis, gout, posttraumatic arthropathies, mechanical neck and back syndromes)
Myalgia (e.g., myofascial pain syndromes)
Skin and mucosal ulcerations
Nonarticular inflammatory disorders (e.g., polymyalgia rheumatica)
Ischemic disorders
Visceral pain (pain of internal organs and viscera)
Neuropathic pain
Postherpetic neuralgia
Trigeminal neuralgia
Painful diabetic polyneuropathy
Post-stroke pain (central pain)
Postamputation pain
Myelopathic or radiculopathic pain (e.g., spinal stenosis, arachnoiditis, root sleeve fibrosis)
Atypical facial pain
Causalgia-like syndromes (complex regional pain syndromes)
Mixed or undetermined pathophysiology
Chronic recurrent headaches (e.g., tension headaches, migraine headaches, mixed headaches)
Vasculopathic pain syndromes (e.g., painful vasculitis)
Psychologically based pain syndromes
Somatization disorders
Hysterical reactions

persistence of pain, this is described as psychogenic pain. Examples may include conversion reactions and somatoform disorders.[27] Patients with these disorders may benefit from specific psychiatric treatments, but traditional medical interventions for analgesia are not indicated.

Age-associated changes in pain perception have been a topic of interest ever since older adults have been observed to present with unusually painless manifestations of common illness.[28–31] Neuroanatomic and neurochemical findings have shown that the perception of pain and its modulation in the central nervous system are extremely elaborate and complex.[32–34] Unfortunately, little is known about the effect of age alone on most of these complex neural functions. Although there may be altered transmission along A-delta and C nerve fibers associated with aging, it is not clear how this might affect an individual's experience of pain.[4,35] Experimental studies of pain sensitivity and pain tolerance across all ages (young and old persons) have had mixed results. In the final analysis, age-related changes in pain perception are probably not clinically significant.[36]

The most common strategy for pain management is the use of analgesic drugs. Unfortunately, older patients have commonly been systematically excluded from clinical trials of such drugs. In a 1993 report of 83 randomized trials of nonsteroidal anti-inflammatory drugs (NSAIDs), which included nearly 10,000 subjects, only 2.3% were aged 65 or older and none were aged 85 or older.[37] Although older people are more likely to experience the side effects of analgesic medications, they also appear to be more sensitive to analgesic properties, especially those of opioid analgesics. For example, single-dose studies comparing younger and older subjects with postoperative and chronic cancer pain have observed higher peak pain relief and longer duration of action among older subjects for morphine and other opioid drugs.[38–40]

The use of opioid analgesic drugs for chronic non-cancer-related pain remains controversial.[41] Reluctance to prescribe these drugs has probably been overinfluenced by political and social pressures to control illicit drug use among people who take these medications for emotional rather than medical reasons.[42] However, addictive behavior among patients taking opioid drugs for medical indications appears to be very low.[41,43–45] This is not to suggest that morphine and other opioid drugs should be used indiscriminately but only that fear of addiction and other side effects does not justify failure to treat severe pain, especially in those near the end of life.

GUIDELINE DEVELOPMENT PROCESS AND METHODS

The American Geriatrics Society has published position papers on the care of patients near the end of life.[46,47] In these publications the Society has promoted the goals of comfort and dignity for all patients near the end of life. Inherent in these goals is the obligation of clinicians to provide effective pain management in all cases, even if doing so may hasten death by a few hours or days.

Clinical practice guidelines have been published by the Agency for Health Care Policy and Research to address the management of acute and postoperative pain,[48] the management of cancer pain,[49] and the management of acute back pain.[50] Guidelines have also been published by the American Pain Society[51] on analgesic medication for acute pain and cancer pain. These guidelines have been broad in scope, but they generally have not included considerations that are unique to the care of older patients. Treatment for chronic non-cancer-related pain has often been neglected, especially among those with nonterminal illness. Alternative care settings such as nursing homes and homes also present unique challenges about which previous guidelines have not been especially sensitive.

This project was organized to develop clinical practice guidelines specifically for the management of chronic non-cancer-related pain in older persons. The goals were to provide the reader with an overview of broad principles of chronic pain management as they apply specifically to older people and with specific recommendations to aid in decision making about pain management for this population. This is not meant to be an exhaustive, academic treatise on the subject but, rather, a practical and usable guide for clinicians so that they may rapidly upgrade their skills in the management of chronic pain problems common in the geriatric population. We have tried to avoid duplication of the work of previous guideline panels. These guidelines focus on issues that are unique to the geriatric population and on areas that have been omitted or less well developed in previous publications. We hope that our efforts will be helpful to clinicians in practice as well as to researchers and policy makers. Ultimately, we hope the beneficiaries of this work will be our patients who require effective pain management to maintain their dignity and quality of life.

The recommendations that follow are largely derived from consensus among a panel of experts from the fields of

geriatrics, pain management, psychology, pharmacology, and nursing. After an extensive search of the medical literature for data-based publications on the subject of pain in older (or aged) persons, members of the panel abstracted and reviewed the reports. It is important to note that existing evidence-based literature on the assessment and management of chronic pain – specifically in older people – was found to be very limited in sample and design. Much of the literature presented chronic pain in a disease-specific approach, and the number of pain-producing diseases studied was very large. Few randomized clinical trials were identified, and meta-analyses were nonexistent. Outcome data were not adequate to suggest definitive algorithms in most clinical situations. Panel members sometimes drew on data derived from studies of younger patients that could be extrapolated reasonably to older persons. However, data-based literature describing chronic pain in younger populations could not always be extrapolated easily to the oldest old or to the alternative care settings where older patients are often encountered. Once the literature review was completed, panel members formulated recommendations and then reassessed them to produce the set of recommendations for external review by a variety of experts from other organizations with interest in this subject.

Many issues in chronic pain management are beyond the scope of this limited project and so are not addressed by guideline recommendations. Clearly, a number of barriers still stand in the way of the improvement of pain management in clinical practice; these barriers often involve larger issues of medical education, attitudes, medical economics, law, and health systems organization. We hope that this initial work will stimulate others to collaborate, study, revise, and develop new solutions for the significant issues not addressed by this panel.

The guidelines for improving clinical practice have been divided into four sections: Assessment of Chronic Pain in Older Persons, Pharmacologic Treatments of Chronic Pain in Older Persons, Nonpharmacologic Strategies for Pain Management in Older Persons, and Recommendations for Health Systems That Care for Older Persons. For each section, general principles are presented with specific references provided, followed by the panel's recommendations for improving clinical assessment and management of chronic pain in older persons.

ASSESSMENT OF CHRONIC PAIN IN OLDER PERSONS

General Principles

A thorough initial assessment is crucial to understanding the causes and pathophysiology of chronic pain in the older adult.[52] Pain management is most successful when the underlying cause of pain is identified and treated definitively. Inherent in the assessment of chronic pain is the need to evaluate acute pain that may indicate new concurrent illness and to distinguish this from exacerbations of chronic pain. Among those for whom the underlying cause is not remediable or only partially treatable, a multidisciplinary assessment and treatment strategy is often indicated.[53] It should be remembered that there are no objective biological markers for the presence of pain. The most accurate and reliable evidence of the existence of pain and its intensity is the patient's report.[3] Even patients with mild to moderate cognitive impairment can be assessed with simple questions and screening tools.[16,54–58] Health care professionals as well as family and informal caregivers must believe patients and take their reports of pain seriously.

Older patients themselves may present substantial barriers to accurate pain assessment.[56] They may be reluctant to report pain despite substantial physical or psychological impairment.[14] Not only do older people expect pain with aging, but they often describe discomfort, hurting, or aching rather than use the specific word *pain*.[57] They may be reluctant to talk about pain because they may fear the need for diagnostic tests or medications that have side effects. For some patients, pain is a metaphor for serious disease or death. For others, pain and suffering represent atonement for past actions.[22] Sensory and cognitive impairment, common among frail older people, make communication more difficult. Fortunately, pain can be assessed accurately in most patients by the use of techniques adapted for the individual patient's needs and handicaps.[16,58]

Specific Recommendations

I. On initial presentation of any older person to any health care service, a health care professional should assess the patient for evidence of chronic pain.

II. Any persistent or recurrent pain that has a significant impact on function or quality of life should be recognized as a significant problem.

III. A variety of terms synonymous with pain should be used to screen older patients (e.g., *burning, discomfort, aching, soreness, heaviness, tightness*).

IV. For those with cognitive or language impairments, nonverbal pain behavior, recent changes in function, and vocalizations suggest pain as a potential cause (e.g., changes in gait, withdrawn or agitated behavior, moaning, groaning, or crying).

V. For those with cognitive or language impairments, reports from a caregiver should be sought.

VI. Conditions that require specific interventions should be identified and treated definitively if possible.
   A. Underlying disease should be managed optimally.
   B. Patients who need specialized services or skilled procedures should be referred for consultation to a healthcare specialist who has expertise in such services and procedures.
      1. Patients identified as having debilitating psychiatric complications should be referred for psychiatric consultation.
      2. Patients identified as abusing or as being addicted to any legal or illicit substance should be referred for consultation with an expert who has experience in pain and addiction management.
      3. Patients with life-altering intractable pain should be referred to a multidisciplinary pain management center.

VII. All patients with chronic pain should undergo comprehensive pain assessment. (Figure 1 provides an example of a medical record form that can be used to summarize the initial pain assessment.[59])

GERIATRIC PAIN ASSESSMENT

Date:_____ Medical Record Number_____

Patient's Name_____

Problem List: Medications:

_____ _____
_____ _____
_____ _____
_____ _____
_____ _____

Pain Description:

Pattern: Constant Intermittant
Duration:_____
Location:_____
Character:
Lancinating Burning Stinging
Radiating Shooting Tingling

Pain Intensity:
0 1 2 3 4 5 6 7 8 9 10
None Moderate Severe

Worst Pain in Last 24 hours:
0 1 2 3 4 5 6 7 8 9 10
None Moderate Severe

Other Descriptors:
_____
_____
_____
_____

Mood:_____

Depression Screening Score: _____

Gait and Balance Score: _____

Exacerbating Factors:
_____
_____

Impaired Activities:
_____
_____
_____

Relieving Factors:
_____
_____

Sleep Quality: _____
Bowel Habits: _____
_____

Other Assessments or Comments: _____
_____
_____

Most Likely Cause of Pain:_____

Plans: _____
_____
_____
_____

Figure 1. Example of a medical record form that can be used to summarize pain assessment in older persons.[59]

A. Comprehensive pain assessment should include a medical history and physical examination, as well as a review of the results of the pertinent laboratory and other diagnostic tests, with the goals of recording a temporal sequence of events that led to the present pain complaint and establishing a definitive diagnosis, plan for care, and likely prognosis.
B. Initial evaluation of the present pain complaint should include characteristics such as intensity, character, frequency (or pattern, or both), location, duration, and precipitating and relieving factors.
C. Initial evaluation should include a thorough analgesic medication history, including current and previously used prescription medications, over-the-counter medications, and "natural" remedies. The effectiveness and any side effects of current and previously used medications should be recorded.
D. Initial evaluation should include a comprehensive physical examination with particular focus on the neuromuscular system (e.g., search for neurologic impairments, weakness, hyperalgesia, hyperpathia, allodynia, numbness, paresthesia) and the musculoskeletal system (e.g., palpation for tenderness, inflammation, deformity, trigger points).
E. Initial evaluation should include evaluation of physical function.
   1. Evaluation of physical function should include a focus on pain-associated disabilities, including activities of daily living (e.g., Katz ADLs,[60] Lawton IADLs,[61] FIMS,[62] Barthel Index[63]).
   2. Evaluation of physical function should include performance measures of function (e.g., range of motion, Up-and-Go Test,[64] Tinetti Gait and Balance Test[65]).
F. Initial evaluation should include evaluation of psychosocial function.
   1. Evaluation of psychosocial function should include assessment of the patient's mood, especially for depression (e.g., a geriatric depression scale,[66] CES-D scale[67]).
   2. Evaluation of psychosocial function should include assessment of the patient's social networks, including any dysfunctional relationships.
G. A quantitative assessment of pain should be recorded by the use of a standard pain scale (e.g., visual analogue scale, word descriptor scale, numerical scale[58, 68]) (see Figure 2).
   1. Patients with cognitive or language barriers should be presented with scales that are tailored for their needs and disabilities (e.g., scales adapted for speakers of a foreign language, scales in large print, or scales for the visually impaired that do not require visual-spatial skills).
   2. Quantitative estimates of pain based on clinical impressions or surrogate reports should not be used unless the patient is unable to reliably make his or her needs known.

VIII. Patients with chronic pain and their caregivers should be instructed to use a pain log or pain diary with regular entries for pain intensity, medication use, response to treatment, and associated activities. (Figure 3 provides an example of a medical record form that can be used as a pain diary or to record pain assessments over time[69]).

IX. Patients with chronic pain should be reassessed regularly for improvement, deterioration, or complications attributable to treatment. The frequency of follow-up should be a function of the severity of the pain syndrome and the potential for adverse effects of treatment.
   A. Reassessment should include evaluation of significant issues identified in the initial evaluation.
   B. The same quantitative assessment scales should be used for follow-up assessments.
   C. Reassessment should include an evaluation of analgesic medication use, side effects, and adherence problems.
   D. Reassessment should include an evaluation of the positive and negative effects of any nonpharmacologic treatments.

PHARMACOLOGIC TREATMENT OF CHRONIC PAIN IN OLDER PERSONS

GENERAL PRINCIPLES

The most common treatment of pain in older people involves the use of analgesic drugs.[23] All pharmacologic interventions carry a balance of benefits and burdens. The patient should be given an expectation of pain relief, but it is unrealistic to suggest or sustain an expectation of complete relief for some patients with chronic pain.[49] The goals, expectations, and tradeoffs of possible therapies need to be discussed openly. A period of trial and error should be anticipated when new medications are initiated and while titration occurs. Review of medications, doses, use patterns, efficacy, and adverse effects should be a regular process of care, and seemingly ineffective drugs should be tapered and discontinued.

Although older people are more likely to experience adverse reactions, analgesic drugs are safe and effective for use by this population.[70] For some classes of pain-relieving medications (opioids, for example), older patients have been shown to have increased analgesic sensitivity.[38–40,71] However, because the older population is heterogeneous, optimum dosage and side effects are difficult to predict. Recommendations for age-adjusted dosing are not available for most analgesics. The adage "start low and go slow" is probably appropriate for most drugs known to have high side-effect profiles in the older adult.[70,71] In reality, dosing for most patients requires careful titration, including frequent assessment and dosage adjustments, to optimize pain relief while monitoring and managing side effects.

Pharmacologic therapy is most effective when combined with nonpharmacologic strategies to optimize pain management.[49,72] Analgesic drugs should also supplement other medications directed at definitive treatment or optimum management of underlying disease. It is recognized that there are major potential problems with multiple drug use by older patients. However, polypharmacy (the use of more than one agent to effect a therapeutic endpoint) may be necessary to minimize dose-limiting adverse effects of a particular drug

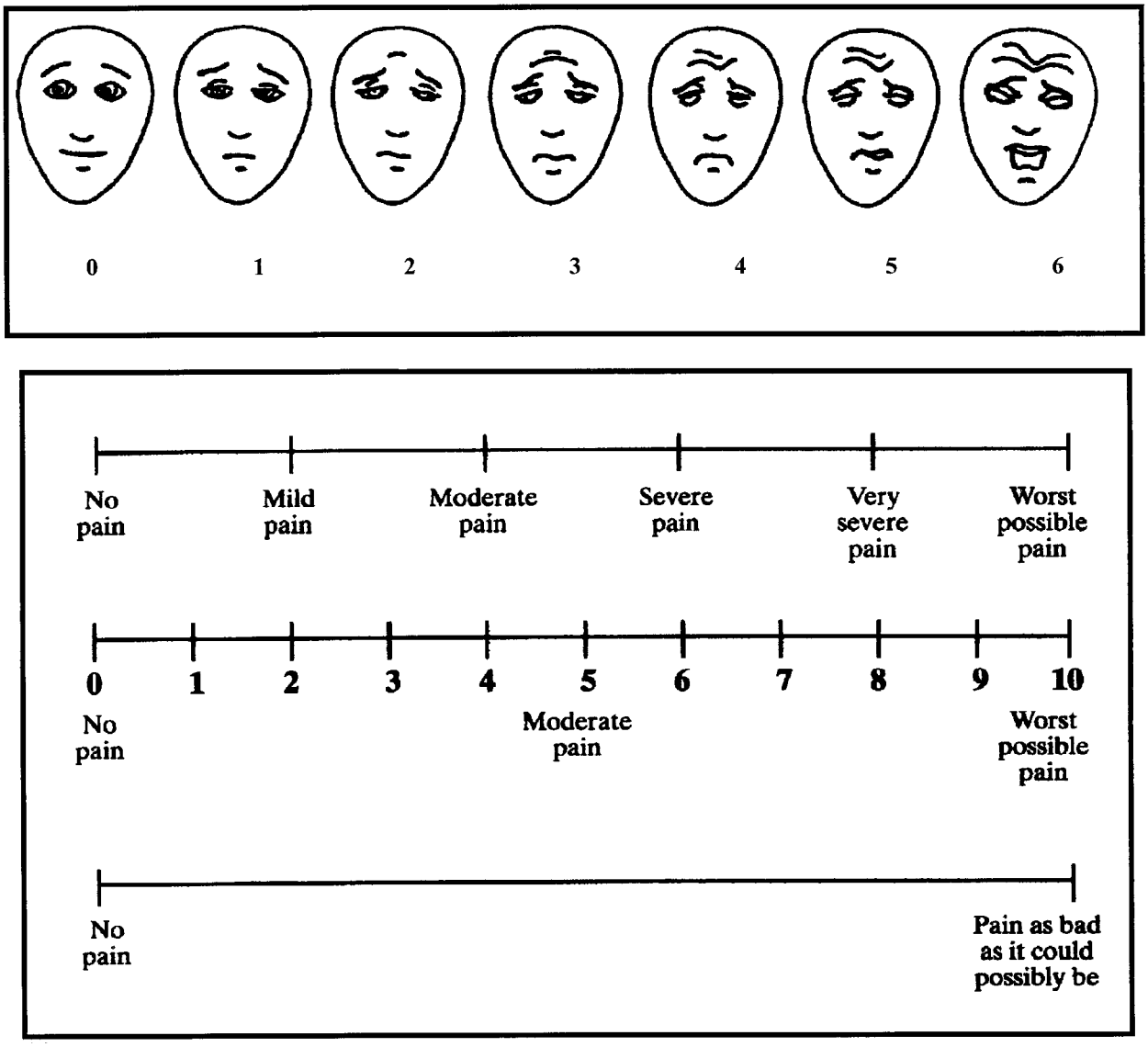

Figure 2. Examples of pain intensity scales for use with older patients. 1. A faces scale.[58,68] Reprinted from Pain 1990;41(2):139–150, with kind permission of Elsevier Science – NL, Sara Burgerhartstraat 25, 1055 KV Amsterdam, The Netherlands. 2. Visual analogue scales.[48,49]

class.[49] Combining smaller effective doses of differing drug classes may produce pain relief without as much risk of the side effects associated with higher doses of a single medication. Close monitoring is important when multiple medications are prescribed, particularly for patients with concurrent medical problems.

In older patients, the chronic use of NSAIDs is associated with a high frequency of adverse effects.[73–76] The risk of gastrointestinal bleeding associated with NSAID use in a general population is about 1%. For those aged 60 or older, the risk reaches 3 to 4%, and for those aged 60 or older with a history of gastrointestinal bleeding, the risk is about 9%.[77] The relative risks and benefits of NSAIDs should be weighed carefully against other available treatments for older patients. For most patients with mild to moderate pain from degenerative joint disease, acetaminophen provides satisfactory pain relief with a much lower risk of side effects than with NSAID drugs.[78,79] The concomitant administration of misoprostol, histamine$_2$-receptor antagonists, proton pump inhibitors, and antacids is only partially successful in reducing the risk of gastrointestinal bleeding associated with NSAID use,[80–82] and the side-effect profiles of these additional medications in this population must be weighed against their potential benefits.[83] It should also be remembered that these gastrointestinal protective drugs do nothing to prevent the renal impairment and other drug-drug and drug-disease interactions commonly associated with NSAIDs. For many patients, chronic opioid therapy, low-dose corticosteroid therapy (for those with inflammatory conditions), or other adjunctive drug strategies (e.g., the use of antidepressants or anticonvulsants for neuropathic pain) may have fewer life-threatening risks than does long-term daily use of high-dose NSAIDs. Table 2 lists some examples of NSAID choices as well as acetaminophen.

The use of opioid drugs for chronic non-cancer-related pain remains controversial, but they are probably underutilized in the treatment of older people.[70] Table 3 provides examples of some opioids used for treating chronic pain in

CHRONIC PAIN RECORD

Date:_____ Medical Record Number_____

Patient's Name:_____

Pain Medications and Directions:

_____

_____

_____

Pain Scale Used*_____

Date	Time	Pain Intensity*	Activity	Action	Results

*Choose an appropriate scale, indicate which scale is being used, and use the same scale for each assessment.

Figure 3. Example of a medical record form that can be used to document pain control over time.[69] Additional columns may be added to monitor side effects or the use of other treatments.

older persons. Fears of drug dependency and addiction are often exaggerated by the desire to reduce illicit drug use in society. The prevalence of narcotic abuse among older people is not known, but those aged 60 or older account for less than 1% of patients attending methadone maintenance programs.[84] Fears of drug dependency and addiction do not justify the failure to relieve pain, especially for those near the end of life. Some state agencies have released prescribing guidelines for the appropriate use of narcotic analgesic drugs for chronic non-cancer-related pain.[85–87]

The doses of opioid analgesic medications needed for the treatment of non-cancer-related chronic pain are often smaller than those used for cancer-related pain. Monitoring the side effects of opioid therapy should focus on neurologic and psychologic functions such as sedation, concentration, and ability to drive. Side effects such as impaired consciousness, hypoxia, myoclonus, and pruritus rarely occur with the use of low- to moderate-dose opioid therapy, especially when doses are started low and escalated slowly.

The so-called adjuvant analgesic drugs are medications not classified formally as analgesics but found to be helpful (i.e., they reduce pain) in certain intractable pain syndromes.[26] The term *adjuvant*, although used frequently, is a misnomer because these non-opioid drugs may be the primary pain-relieving pharmacologic intervention in certain cases. Table 4 provides some examples of non-opioid drugs that may help certain kinds of pain. The largest body of literature concerns the use of tricyclic antidepressants.[88,89] The newer antidepressants (including selective serotonin-reuptake inhibitors (SSRIs)) often have fewer side effects but have not been demonstrated to be very effective as analgesics.[89] Anticonvulsants (e.g., carbamazepine) have also been shown to be helpful in some conditions.[26] It has been observed that failure of response to one agent does not necessarily predict the response to another agent within the same class. Although antidepressants and anticonvulsants may be used simultaneously for some refractory neuropathic pains, this increases the potential for adverse drug reactions, particularly in the older patient. Unfortunately, many of these drugs have high side-effect profiles in older adults. It should be remembered that non-opioid drugs are often only partially successful and rarely provide complete relief.[88] They are often most effective when used for baseline pain management and when supplemented by other specific analgesic drugs for breakthrough pain.

The timing of medications is important.[23] For continuous pain, medications are best given on a regular basis. Additional doses may be required before activities that are known to exacerbate pain. Chronic pain is an exhausting experience.[90] Deconditioning, poor sleep, and poor eating habits can result from unrelieved pain.[14] Most patients can cope better if analgesic drugs are prescribed in an effort to support appropriate exercise, enjoyable activities, and a good night's sleep. With these goals in mind, the clinician should simplify drug regimens as much as possible, and patients and caregivers should have some flexibility in designing regimens for their particular needs and life styles.[91] Clinical endpoints for pharmacologic interventions should not concentrate on reduced drug dose but rather focus on decreased pain, improved function, and improved mood and sleep.

Economic issues do play a major role in current pain management and should enter into decision-making pro-

Table 2. Acetaminophen and Nonsteroidal Anti-Inflammatory Drugs*†

Drug	Maximum Dosage	Pharmacologic Changes	Precautions and Recommendations
Acetaminophen‡§ (Tylenol)	4000 mg/24 h (q 4–6 h dosing)	Hepatotoxic above maximum dose	Avoid exceeding maximum recommended dose
Aspirin‡§	4000 mg/24 h (q 4–6 h dosing)	Gastric bleeding; abnormal platelet function	Avoid high doses for prolonged periods of time
Ibuprofen‡ (Motrin, Advil, Nuprin, etc.)	2400 mg/24 h (q 6–8 h dosing)	Gastric, renal, and abnormal platelet function may be dose-dependent; constipation, confusion, and headaches may be more common in older patients	Avoid high doses for prolonged periods of time
Naproxen‡§ (Naprosyn)	1000 mg/24 h (q 8–12 h dosing)	Similar toxicity to ibuprofen	Avoid high doses for prolonged periods of time
Choline magnesium trisalicylate‡‖ (Trilisate)	5500 mg/24 h (q 8–12 h dosing)	Prolonged half-life of 8–12 h; similar toxicity to ibuprofen; classic salicylate toxicity may develop at high dose	Tests for salicylate levels may be necessary occasionally to avoid toxicity

*Limited number of representative examples only for demonstrative purposes. Comprehensive lists of other classes of NSAIDs and a multitude of brand names can be located elsewhere. There is no evidence of increased efficacy or decreased adverse effects (other than specific allergic sensitivities) to warrant the extremely high costs of most proprietary variations.
†Clinicians should monitor the literature closely for availability and cost-risk-benefit analyses of the cyclo-oxygenase-2-inhibitor class of NSAIDs, which should be commercially available soon.
‡Available in liquid form.
§Available in suppository form.
‖Minimum platelet dysfunction.

Table 3. Opioid Analgesic Drugs

Drug	Oral Equivalent	Starting Dosage	Aging Effects	Precautions and Recommendations
Short-acting drugs				
Morphine sulfate (Roxanol, MSIR)	30 mg	15–30 mg q 4 h	Intermediate half-life; older people are more sensitive than younger people to side effects	Start low and titrate to comfort; continuous use for continuous pain; intermittent use for episodic pain; anticipate and prevent side effects
Codeine (plain codeine, Tylenol with codeine, other combinations)	120 mg	30–60 mg q 4–6 h	Acetaminophen-NSAID* combinations limit dose; constipation is a major issue	Begin bowel program early; do not exceed recommended maximum dose
Hydrocodone (Vicoden, Lortab, others)	30 mg	5–10 mg q 3–4 h	Acetaminophen-NSAID* combinations limit dose; toxicity similar to morphine	Anticipate and prevent side effects; begin bowel program early; do not exceed recommended maximum dose
Oxycodone (Roxicodone, Oxy IR, Percodan, Tylox, Percocet)	20–30 mg	5–10 mg q 3–4 h	Acetaminophen-NSAID* combinations limit dose; toxicity similar to morphine; oxycodone is available as a single agent	Anticipate and prevent side effects; begin bowel program early; do not exceed recommended maximum dose
Hydromorphone (Dilaudid)	7.5 mg	1.5 mg q 3–4 h	Half-life may be shorter than morphine (3 h); toxicity similar	Similar to morphine; start low and titrate to comfort; give continuously (q 3–4 h) for continuous chronic pain disorders
Long-acting drugs				
Sustained-release* morphine (MS Contin,‡ Kadian,†§ Oramorph SR‡)	30 mg	15–30 mg q 12 h or 24 h equivalent of total prior analgesics in divided doses q 12 h	Rarely requires more frequent dosing than recommended on package insert	Escalate dose slowly because of possible drug accumulation; immediate-release opioid analgesic often necessary for breakthrough pain
Sustained-release* oxycodone (Oxycontin)	20–30 mg	10–20 mg q 12 h or 24 h equivalent of total prior analgesics in divided doses q 12 h	Similar to sustained-released morphine	Immediate-release opioid often necessary for breakthrough pain
Transdermal fentanyl (Duragesic)	NA (see package insert)	>25 μg/h not recommended in opioid-naive patients	Effective activity may exceed 72 h in older patient (transdermal patches designed for 3-day duration of action)	Titrate slowly using immediate-release analgesics for breakthrough pain; peak effects of first dose may take 18–24 h

*These preparations are *not* to be broken, crushed, or dissolved. They must be used as formulated to provide continuous-release activity.
†Every 24 hour dosing.
‡Every 8–12 hour dosing.
§Capsules can be opened and contents sprinkled on applesauce for easier ingestion without altering activity of the drug.

Table 4. Non-Opioid Drugs for Analgesia

Drug	Starting Dose (po)	Specific Indications	Pharmacologic Changes	Precautions and Recommendations
Corticosteroids (prednisone)	2.5–5.0 mg daily	Inflammatory disease	Increased risk of hyperglycemia, osteopenia, and Cushing phenomenon	Avoid high dose for long-term use
Antidepressants (amitriptyline, desipramine, doxepin, imipramine, nortriptyline)	10 mg HS	Neuropathic pain, sleep disturbance	Increased sensitivity to side effects, especially anticholinergic effects	Monitor carefully for anticholinergic adverse effects; desipramine may be as effective as amitriptyline with fewer side effects; start at lowest available dose, 10 mg, and titrate HS dose upward by 10 mg every 3–5 days
Anticonvulsants				
Clonazapam	0.25–0.5 mg	Neuropathic pain		
Carbamazepine (Tegretol)	100 mg	Only for lancinating pain, e.g., trigeminal neuralgia	Can cause somnolence, ataxia, dizziness, leukopenia, thrombocytopenia, and rarely aplastic anemia	Start at 100 mg qd, increase slowly bid, 200 mg qd, then bid; check LFTs, CBC, RF at baseline; CBC at 2 then 8 weeks
Gabapentin (Neurontin)	100 mg	Neuropathic pain	May prove to have less serious side effects than carbamazepine	Start with low dose (100 mg) and titrate up slowly to effect; neuropathic doses not yet established; titrate to tid dosing; monitor for idiosyncratic side effects, e.g., ankle swelling, ataxia; dose range for efficacy anecdotally reported 100–800 mg tid
Anti-arrhythmics				
Mexiletine (Mexitil)	150 mg	Neuropathic pain	Side effects such as tremor, dizziness, unsteadiness, paresthesias are common; rarely hepatic damage and blood dyscrasias occur	Avoid use in patients with pre-existing heart disease; start with low dose and titrate slowly; recommend initial and follow-up ECGs; titrate to tid-qid dosing
Local Anesthetics (intravenous) Lidocaine	3–5 mg/kg infused every 15–30 minutes	Diagnostic test	Delirium common	May be useful predictor of response to mexiletine or other oral local anesthetics for neuropathic pain; diagnostic test only in a monitored environment where seizure, delirium, airway control, and hemodynamic alterations can be managed
Other agents				
Baclofen	5 mg	Neuropathic pain, muscle spasms	Probable increased sensitivity and decreased clearance	Monitor for weakness, urinary dysfunction; avoid abrupt discontinuation due to CNS irritability

CBC = complete blood cell count; CNS = central nervous system; ECG = electrocardiogram; HS = hour of sleep or at bedtime; LFT = liver function tests; RF = renal function.

cesses at some level.[92] Economic considerations should be used to make balanced decisions after sound principles of assessment and treatment have been followed. Clinicians should be aware of common economic barriers patients and their families may encounter, including the lack of Medicare reimbursement for outpatient oral medications, limited formularies, and delays from mail-order pharmacies in some managed-care programs, as well as limited availability of strong opioid analgesics from some pharmacies.

Finally, it is axiomatic that all medication management must be tailored to the individual patient's needs and situations. Information provided herein is meant to serve as a guide only and should not be used in lieu of clinical judgment.

Specific Recommendations

I. All older patients with diminished quality of life as a result of chronic pain are candidates for pharmacologic therapy.

II. The least invasive route of administration should be used (this is usually the oral route).

III. Fast-onset, short-acting analgesic drugs should be used for episodic (i.e., chronic recurrent or noncontinuous) pain.

IV. Acetaminophen is the drug of choice for relieving mild to moderate musculoskeletal pain. The maximum dosage of acetaminophen should not exceed 4000 mg per day.

V. NSAIDs should be used with caution.
   A. High-dose, long-term NSAID use should be avoided.
   B. When used chronically, NSAIDs should be used as needed, rather than daily or around the clock.
   C. Short-acting NSAIDS may be preferable to avoid dose accumulation.
   D. NSAIDs should be avoided in patients with abnormal renal function.
   E. NSAIDs should be avoided in patients with a history of peptic ulcer disease.
   F. NSAIDs should be avoided in patients with a bleeding diathesis.
   G. The use of more than one NSAID at a time should be avoided.
   H. Ceiling dose limitations should be anticipated (i.e., maximum dose may be unattainable because of toxicity or may be accompanied by lack of efficacy).

VI. Opioid analgesic drugs may be helpful for relieving moderate to severe pain, especially nociceptive pain.
   A. Opioids for episodic (i.e., chronic recurrent or noncontinuous) pain should be prescribed as needed, rather than around the clock.
   B. Long-acting or sustained-release analgesic preparations should be used only for continuous pain.
      1. Breakthrough pain should be identified and treated by the use of fast-onset, short-acting preparations. Breakthrough pain includes the following three types:
         a. *End-of-dose failure* is the result of decreased blood levels of analgesic with concomitant increase in pain before the next scheduled dose.
         b. *Incident pain* is usually caused by activity that can be anticipated and pretreated.
         c. *Spontaneous pain,* common with neuropathic pain, is often fleeting and difficult to predict.
      2. Titration should be conducted carefully.
         a. Titration should be based on the persistent need for and use of medications for breakthrough pain.
         b. Titration should be based on the pharmacokinetics and pharmacodynamics of specific drugs in the older person and the propensity for drug accumulation.
         c. The potential adverse effects of opioid analgesic medication should be anticipated and prevented or treated promptly.
      3. Constipation should be prevented.
         a. A prophylactic bowel regimen should be initiated with commencement of analgesic therapy.
         b. Bulking agents should be avoided.
         c. Adequate fluid intake should be encouraged.
         d. Exercise, ambulation, and physical activities should be encouraged.
         e. Bowel function should be evaluated with every follow-up visit.
         f. Rectal examination and disimpaction should occur before use of motility agents.
         g. An osmotic, stimulant, or motility agent should be prescribed, if necessary, to provide regular bowel evacuation.
         h. Motility agents should not be used if signs or symptoms of obstruction are present.
         i. If fecal impaction is present, it should be relieved by enema or manual removal.
      4. Mild sedation and impaired cognitive performance should be anticipated when opioid analgesic drugs are initiated. Until tolerance for these effects has developed:
         a. patients should be instructed not to drive.
         b. patients and caregivers should be cautioned about the potential for falls and accidents.
         c. monitoring for profound sedation, unconsciousness, or respiratory depression (defined as a respiratory rate of <8 per minute or oxygen saturation of $<90\%$) should occur during rapid, high-dose escalations. Naloxone should be used carefully to avoid abrupt reversal of pain and autonomic crisis.
      5. Severe nausea may need to be treated with antiemetic medications, as needed.
         a. Mild nausea usually resolves spontaneously in a few days.
         b. If nausea persists, a trial of an alternative opioid may be appropriate.
         c. Anti-emetic drugs should be chosen from those with the lowest side-effect profiles in older persons.

6. Severe pruritus may be treated with antihistamine medications.
7. Myoclonus may be relieved by the use of an alternate opioid drug or clonazepam in severe cases.

VII. Fixed-dose combinations (e.g., acetaminophen and opioid) may be used for mild to moderate pain.
   A. Maximum recommended dose should not be exceeded to minimize toxicity of acetaminophen or NSAID.
   B. Ceiling effect should be anticipated (i.e., maximum dose may be reached without full efficacy because of limits imposed by toxicity of acetaminophen or an NSAID).

VIII. Patients taking analgesic medications should be monitored closely.
   A. Patients should be re-evaluated frequently for drug efficacy and side effects during initiation, titration, or any change in dose of analgesic medications.
   B. Patients should be re-evaluated on a regular basis for drug effectiveness and side effects throughout long-term analgesic drug maintenance.
      1. Patients on long-term opioid therapy should be evaluated periodically for inappropriate or even dangerous drug-use patterns.
         a. The clinician should watch for indications of the use of medications prescribed for other persons or of illicit drug use (the latter being very rare in this population).
         b. The clinician should ask about prescriptions for opioids from other physicians.
         c. The clinician should watch for signs of narcotic use for inappropriate indications (e.g., anxiety, depression).
         d. Requests for early refills should include evaluation of tolerance, progressive disease, or inappropriate behavioral factors.
         e. These evaluations need to take place with the same medical equanimity accompanying similar evaluations for long-term management of other potentially risky medications (i.e., antihypertensive medications) in order not to burden the patient with excessive worry or unnecessary fears, or to promote "opiophobia."
      2. Patients on long-term NSAIDs should be periodically monitored for gastrointestinal blood loss, renal insufficiency, and other drug-drug or drug-disease interactions.

IX. Non-opioid analgesic medications may be appropriate for some patients with neuropathic pain and some other chronic pain syndromes.
   A. Carbamazepine is the medication of choice for trigeminal neuralgia.
   B. Agents with the lowest side-effect profiles should be chosen preferentially.
   C. Agents may be used alone but often are more helpful when used in combination and to augment other pain management strategies.
   D. Therapy should begin with the lowest possible doses and increased slowly because of the potential for toxicity of many agents.
   E. Patients should be monitored closely for side effects.
   F. Clinical endpoints should be decreased pain, increased function, improvements in mood and sleep, not decreased drug dose.

NONPHARMACOLOGIC STRATEGIES FOR PAIN MANAGEMENT IN OLDER PERSONS

General Principles

Nonpharmacologic approaches, used alone or in combination with appropriate pharmacologic strategies, should be an integral part of care plans for most chronic pain patients.[72] Nonpharmacologic pain management strategies encompass a broad range of treatments and physical modalities. Education programs,[72,93–96] cognitive-behavioral therapy,[97] exercise programs,[94–96] acupuncture,[98] transcutaneous nerve stimulation,[99] chiropractic,[19] heat, cold, massage, relaxation, and distraction techniques have each been helpful for some patients.[100] Moreover, these strategies carry few adverse effects other than cost. Many patients use these approaches, not always with the advice of their primary healthcare provider.[6,100] Although many of these interventions provide short-term relief, few have been shown to have greater benefit than placebo controls in randomized trials for the long-term management of chronic pain in older people. Nonetheless, nonpharmacologic interventions used in combination with appropriate drug regimens often improve overall pain management, enhancing therapeutic effects while allowing reduction of medication doses to prevent or diminish adverse drug effects.[49]

A variety of alternative therapies are also used by many patients.[100] Healthcare providers should be aware that patients with unrelieved chronic pain often seek alternative medicine approaches, including use of homeopathy, naturopathic preparations, and spiritual healing.[6] Although there is little scientific evidence to support these strategies for chronic pain control, it is important that healthcare providers not leave patients with a sense of hopelessness in an effort to discourage unapproved but benign therapies or to debunk healthcare quackery and fraud.

The importance of patient education cannot be overemphasized. Studies have shown that patient education programs alone significantly improve overall pain management.[21] Such education programs commonly include information about the nature of pain and how to use pain assessment instruments, medications, and nonpharmacologic pain management strategies. For many patients, especially older persons, family caregiver education is also essential. Whether the program is conducted one-on-one or organized in groups, it should be tailored to patients' needs and levels of understanding. The use of suitable written materials and appropriate methods for reinforcement is important to the success of the program.

Cognitive strategies are aimed at altering belief structures, attitudes, and thoughts in order to modify the experience of pain and suffering.[101] These include various forms of distraction, relaxation, biofeedback, and hypnosis. Behavioral therapy discourages abnormal, unpredictable, or self-defeating behavior and provides positive reinforcement for successes in achieving goals. Cognitive strategies are usually

combined with behavioral approaches, and together they are known as cognitive-behavioral therapy. Cognitive-behavioral therapy in its most effective form includes a structured approach to teaching coping skills that might be used alone or in combination with pharmacologic therapies for chronic pain control.[101,102] Effective programs can be conducted with patients individually or in groups. There is some evidence that the involvement of a spouse, caregiver, or significant other enhances the effects. Cognitive-behavioral therapy usually requires 6 to 15 sessions (60 to 90 minutes per session) with a trained therapist and includes components of education, rationale for therapy, coping skills training, methods to generalize coping skills, and relapse prevention.[97] Although it may not be appropriate for patients with appreciable cognitive impairment, the favorable results of controlled trials support the use of cognitive-behavioral therapy as a part of the management of most patients with significant chronic pain.

Physical exercise has also been shown to improve pain management in older patients significantly.[93–95,103–109] Clinical trials involving older patients with chronic musculoskeletal pain have shown that moderate levels of training (aerobic and resistance training) on a regular basis are effective in improving pain and functional status. Initial training usually requires 8 to 12 weeks and supervision by a knowledgeable professional who can focus on the special needs of older adults with musculoskeletal conditions. There is no evidence that one type of exercise is better than another; thus, the exercise program should be tailored to the needs and preferences of the patient. The intensity, frequency, and duration should be adjusted to avoid exacerbation of pain while increasing and later maintaining overall conditioning. Feeling better may give the false impression that the discipline of ongoing self-directed exercise is no longer necessary. Continual encouragement and reinforcement is often necessary. Unless contraindications supervene, the program should be maintained indefinitely to prevent deconditioning and deterioration.

Specific Recommendations

I. All patients with diminished quality of life as a result of chronic pain are candidates for nonpharmacologic pain management strategies.

II. Patient education should be provided for all patients with chronic pain.
   A. Content should include information about the known cause(s) of pain, methods of pain assessment and measurement, goals of treatment, treatment options, expectations of pain management, analgesic drug use for pain management (prescription and over-the-counter medications), and self-help techniques, such as the use of heat, cold, massage, relaxation, and distraction.
   B. Educational content should be reinforced during every patient encounter.
   C. Specific patient education should be provided before special treatments or procedures.

III. Nonpharmacologic interventions can be used alone or in combination with pharmacologic strategies for chronic pain management.

IV. Cognitive-behavioral therapies should be a part of the care of older patients troubled by chronic pain.
   A. Cognitive-behavioral therapy should be applied as a structured program that includes components of education, rationale for therapy, coping skills training, methods to generalize coping skills, and relapse prevention.
   B. Cognitive-behavioral therapy should be conducted by a professional.
   C. Plans for a flare-up should be a part of this therapy to prevent self-defeating behavior during episodes of pain exacerbation.

V. Exercise should be a part of the care of all older patients troubled by chronic pain.
   A. Initial training should be conducted over 8 to 12 weeks and should be supervised by a trained professional with knowledge of the special needs of older adults.
   B. Exercise should be tailored to the needs and preferences of the patient in consultation with the primary clinician.
   C. Moderate levels of exercise conditioning (aerobic or resistance training) should be maintained indefinitely.

VI. A trial of physical or occupational therapy is appropriate for the rehabilitation of impaired range of motion, specific muscle weakness, or other physical impairments associated with chronic pain.

VII. Traditional insight-oriented psychotherapy should not be used alone for the management of chronic pain.

VIII. Other nonpharmacologic therapies may be helpful for some patients with chronic pain.
   A. Chiropractic, acupuncture, or transcutaneous nerve stimulation may be helpful for some patients, but they are expensive and have not been shown to have greater benefit than placebo controls in the management of chronic pain. These interventions should be provided only by professionals.
   B. Self-administered heat, cold, and massage and the use of liniments and other topical agents may be helpful for some patients.
      1. Initial instruction and demonstration should be provided by a trained clinician.
      2. Precautions against thermal injury should be provided, especially for patients with sensory disturbances (e.g., diabetic patients) or with cognitive impairment.
      3. Patients should be cautioned about the toxicity of or possible reactions to linaments and other topical agents.

RECOMMENDATIONS FOR HEALTH SYSTEMS THAT CARE FOR OLDER PERSONS

General Principles

The United States healthcare system is probably the most complex in the world. Access to and delivery of quality health care vary considerably, depending on economic and social priorities in each of the 50 states. Medical care is provided by a large number of independent for-profit and not-for-profit healthcare businesses, including ambulatory care facilities,

hospitals, nursing homes, and home-health agencies. Free-standing pharmacies, emergency services, and a variety of other community services contribute substantially to the quality of the American healthcare system. Because of the growing population of older people, many of whom have chronic illnesses, almost every component of the U.S. health-care system can be expected to care for a substantial number of older patients with chronic pain.

The health care system has an obligation to provide comfort and pain management for older patients. Healthcare facilities, quality review organizations, and government regulatory agencies should work together to facilitate structures and processes that ensure access and delivery of quality pain management services. In some cases, organizations need to revise existing regulations that have actually created barriers to effective pain management. Medical license boards and law enforcement agencies, in their efforts to reduce illicit drug use, should recognize their equal obligation to ensure the easy availability of safe and effective pain medications (i.e., opioid analgesic drugs) for those with legitimate medical needs.[85]

Traditionally, health care professionals have not been adequately trained in pain assessment and management.[110–116] This lack of sensitivity to the problem of pain and its sequelae has contributed to both underrecognition and undertreatment of pain in older adults. Progress has been limited by a lack of professional attention to the interdisciplinary model critical to effective care of older adults. Refocusing not only the curricula for trainees but also continuing education for healthcare professionals is the key to assuring optimum care for older adults. Using such education as an indicator of quality by healthcare organizations and accreditation bodies will serve to more fully integrate the principles of pain management into clinical practice. Likewise, empowering consumers with an appreciation of the principles of pain management will create an advocacy for standards by which all providers will eventually be measured.

Today, financial considerations are a part of every healthcare decision. Insurance companies, managed care plans, and federal and state health agencies should recognize the importance of pain management. Adequate reimbursement should be provided for those services that ensure comfort, rehabilitation, and palliative care, especially for those near the end of life. Third-party payers need to consider carefully the financial incentives they create. Policies that favor expensive procedures appropriate for only a few patients may result in needless suffering for many patients. Although these policies may seem financially prudent in the short term, they may result in needless disability and increased health care utilization in the long run.

Specific Recommendations

I. Health care facilities should support policies and procedures for routine screening, assessment, and treatment of chronic pain among all older patients. Health organizations should include pain management as a major domain in the development of clinical pathways.

II. Healthcare facilities (ambulatory care facilities, hospitals, nursing homes, and home-care agencies) should periodically conduct quality assurance or quality improvement (QA or QI) activities in pain management.
   A. QA or QI activities should include appropriate structure and process indicators of pain assessment and treatment activities.
   B. Benchmarks for quality improvement should be established internally and should include quantifiable pain outcomes, including (but not limited to) patient satisfaction.

III. Healthcare financing systems (third-party payers, managed care organizations, and publicly financed programs) should extend resources for chronic pain management.
   A. Present diagnosis-driven reimbursement systems should be revised to improve incentives for pain management and symptom control.
      1. Effective pharmacologic and nonpharmacologic strategies for pain management should be provided.
      2. Cost-containment strategies must not result in the inaccessibility of effective treatment or needless suffering.
   B. Reimbursement should be appropriate for the increased time and resources often necessary for the care of frail, dependent, and disabled older patients in all settings.

IV. Health systems (integrated networks and community health planners) should ensure accessibility to specialty pain services.

V. Specialty pain services should be accredited and adhere to guidelines defined by quality review organizations.

VI. Pain-management education for all health care professionals should be improved at all levels.
   A. Professional health school curricula should provide substantial training and experience in chronic pain management in older adults.
      1. Curricula should adhere to curriculum guidelines established by the International Association for the Study of Pain (IASP).
      2. Trainees should demonstrate proficiency in pain assessment and management.
   B. Health systems should provide continuing education in pain assessment and management to health professionals at all levels.
   C. Accreditation bodies should include pain management curriculum content as evaluation criteria.
   D. Pain management should be included in consumer information services.

VII. Programs and regulations designed to decrease illicit drug use should be revised to eliminate barriers to chronic pain management for the older patient.
   A. State medical license boards should publish professional standards or guidelines for prescribing controlled substances for pain, including professional standards for chronic use, expectations for medical record documentation, and standards for professional conduct review.
   B. State medical license boards must eliminate clinicians' trepidation over conduct review that has become a major barrier to the prescription of effective medications.

C. Law and drug enforcement agencies should recognize their role in facilitating and providing easy access to the legitimate use of controlled substances for patients in pain.
D. Law and drug enforcement agencies should publish information for clinicians and the public regarding legal and illegal prescribing, dispensing, storage, disposal, and use of controlled substances for pain management.

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PREFACE

This report is provided to the Committees on Armed Services and the full Congress pursuant to Section 731 of Public Law 103-337 and Section 739 of Public Law 105-85 by the following Doctor of Chiropractic members of the CHCDP Oversight Advisory Committee:

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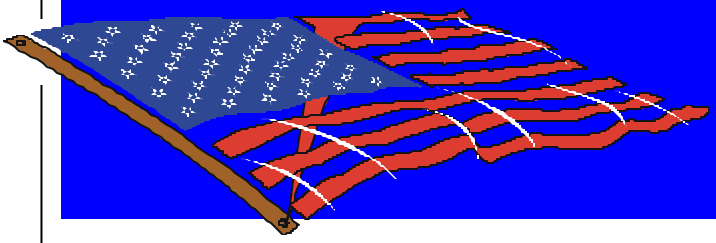
REPORT

ON THE DEPARTMENT OF DEFENSE

CHIROPRACTIC HEALTH CARE DEMONSTRATION PROGRAM



Prepared by the
Chiropractic Members of the
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in collaboration with
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March 3, 2000

Submitted Pursuant to Section 731 of
Public Law 103-337 and Section 739 of
Public Law 105-85

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Section 731 of the National Defense Authorization Act for Fiscal Year 1995 (Public Law 103-337) mandated the conduct of the Chiropractic Health Care Demonstration Program (CHCDP) and the establishment of an oversight advisory committee (OAC) to assist and advise the Secretary of Defense in the development and conduct of the CHCDP, including the preparation of reports to the Congress. Congress directed the Secretary of Defense, with the assistance of OAC members, to evaluate the feasibility and advisability of introducing chiropractic care into the military health service (MHS) based on the CHCDP.

This report was prepared because the Doctor of Chiropractic members of the OAC do not believe that they have been afforded sufficient opportunity for input during the course of the CHCDP nor was their involvement sought in the analysis of CHCDP data or preparation of the draft final report by Birch & Davis, the CHCDP contractor. The results of this independent analysis of the CHCDP and associated data are presented below.

Is it both feasible and advisable to introduce chiropractic care into the MHS?

Yes. An evaluation of the data used in the CHCDP overwhelmingly indicates that it is both feasible and advisable to introduce chiropractic care into the MHS.

What would be the annual net savings to the Department of Defense (DoD) of introducing an open benefit policy for chiropractic care?

Birch & Davis estimate that the cost to the MHS of an open benefit policy for chiropractic care would be $70.9 million. However, these costs will be reduced by offsets for inpatient care, emergency room services, physician services, physical therapy, other services, and recovered days. These cost offsets which will result in annual net savings to the DoD of $25.8 million, explicitly demonstrate the advisability of adding chiropractic care to the MHS.

Annual Net Savings To DoD		
Cost	***Components***	***Source***
$70,926,671.64	Unconstrained Demand Open Benefit	B&D Report Page IV-2
$27,824,195.08	Central Range Recovered Days Savings (N=199,000)	B&D Report Page IV-2
$18,028,204.45	Total Eliminated Charges With Chiropractic Services	Page 34
$50,890,528.70	Total Saved Charges From Physical Therapy Substitution	Page 33
$25,816,256.59	***Annual Net Savings To DoD***	

How much of a problem are spinal maladies in the Armed Forces of the U.S.?

The Birch & Davis report indicates that spinal maladies remain a major problem for the military. Using data from the CHCDP report, we estimate that about 5 percent of all military personnel will be treated for lower back pain during a given year. Additionally, the Demonstration illustrates the inadequacy of the MHS to currently address this problem. Integrating chiropractic care into the MHS will help address the current inadequacies and lack of options to access appropriate services for the treatment of lower back pain.

Did CHCDP participants who utilized chiropractic care for the treatment of lower back pain experience superior outcomes compared to patients who received more traditional types of care?

Yes. Military personnel who used chiropractic care for the treatment of lower back pain experienced superior outcomes compared to patients who received care from traditional medical providers. A higher proportion of chiropractic patients reported that they felt better, had less pain, and had fewer restrictions/physical limitations than patients receiving traditional medical care. Chiropractic patients also reported fewer days away from work or on restricted duty due to their medical condition.

Did chiropractic patients report higher levels of satisfaction than did patients receiving traditional medical care for treatment of lower back pain?

Yes. A review of CHCDP data indicates that chiropractic patients are more satisfied with their care than are patients who received traditional medical treatments. A higher proportion of patients seen by Doctors of Chiropractic reported greater satisfaction with their improvement (and their providers) compared to patients treated by traditional medical providers.

What are the implications of integrating chiropractic care into the MHS on military readiness and retention?

Integrating chiropractic care into the MHS will result in improved access to health care services for military personnel and will lead to the recovery of between 111,000 and 331,000 additional duty days per year. Improved access is directly correlated with patient satisfaction and is viewed by the DoD as a mechanism to enhance quality of life and raise morale among active duty personnel. Since results from the CHCDP indicate that military personnel who received chiropractic care returned to work faster and spent fewer days on restricted duty due to their medical conditions, there is reason to believe that integrating chiropractic care into the MHS will lead to enhanced readiness and increased retention in the military.

SECTION I

INTRODUCTION

INTRODUCTION

Section 731 of the National Defense Authorization Act for Fiscal Year 1995 (Public Law 103-337) mandated the conduct of the Chiropractic Health Care Demonstration Program (CHCDP) and the establishment of an oversight advisory committee (OAC) to assist and advise the Secretary of Defense in the development and conduct of the CHCDP, including the preparation of reports to the Congress and the evaluation of the program. A copy of the CHCDP final report to Congress, prepared by Birch & Davis, the lead contractor on the CHCDP, has been prepared and forwarded to Admiral Thomas F. Carrato, Chief Operating Officer, TRICARE Management Activity. An initial draft of this report was made available to the Doctor of Chiropractic members of the OAC in November 1999, with a very short comment period. The OAC was not afforded an opportunity to meet and discuss the Birch & Davis draft before it was released for review. Also, an inordinately short amount of time was permitted for comments. A revised copy of the final report was received on February 16, 2000, with just one week allowed for submitting comments.

The current report was prepared because the Doctor of Chiropractic members of the OAC do not believe that they have been afforded sufficient opportunity for input during the course of the CHCDP nor was their involvement sought in the analysis of CHCDP data or preparation of the draft final report as mandated by Congress. Clearly, the report attests to the feasibility of providing chiropractic services in the military health system (MHS). However, in the opinion of the Doctor of Chiropractic members of the OAC, the final report does not adequately reflect the advisability of including chiropractic services in the MHS. Hence, we have prepared this report to address issues that we believe have not been adequately dealt with in the DoD report as well as to summarize some of the important findings from the Birch & Davis draft.

The remainder of this report is organized into 4 Sections. Section II presents background information on the CHCDP, including the legislative history. Findings concurrent with the CHCDP report are presented in Section III. Additional findings, including an estimation of the cost savings of chiropractic care to the MHS, are discussed in Section IV. Our recommendations for development and implementation of a plan to integrate chiropractic care into the MHS are presented in Section V.

Additionally, three appendices are included. Appendix A provides information on the nature of chiropractic care and its relationship to other aspects of health care. Contained in Appendix B is a copy of the December 1, 1999 letter that we, the chiropractic members of the OAC, submitted to Admiral Carrato, Chief Operating Officer, TRICARE Management Activity, critiquing the initial Birch & Davis draft of the CHCDP final report. Our February

23, 2000 letter to Admiral Carrato reviewing the Birch & Davis February 10, 2000 revised final report is included as Appendix C.

SECTION II

BACKGROUND AND LEGISLATIVE HISTORY

BACKGROUND AND LEGISLATIVE HISTORY

As mentioned in the Introduction, the CHCDP, including creation of the OAC, was mandated by Public Law 103-337. In 1997, the CHCDP was extended by Section 739 of Public Law 105-85, The National Defense Authorization Act for Fiscal Year 1998, for two additional years to expand the number of the participating sites and to further explore prospects of providing chiropractic health care services to the military on a more permanent basis.

Last year, Congress terminated the CHCDP but required the Department of Defense (DoD) to maintain, as a minimum, the current level and scope of chiropractic care services at the 13 authorized sites until at least September 30, 2000. More importantly, Congress further reinforced and reaffirmed the critically important role of the OAC by directing the Secretary of Defense to make full use of the OAC in preparing the final report on the CHCDP. Congress also directed the Secretary of Defense to provide opportunities for OAC members to provide their views as part of such a report. As a key component of this legislation, House Report 106-301 contained further reaffirmation of the OAC's preeminent role in the CHCDP by directing the Secretary of Defense to ensure that the OAC be "full participants" in the "collection and analysis of data and preparation of the final report." The House Report further authorized preparation of a minority report to be forwarded as part of the CHCDP final report, if necessary. Finally, Congress directed that the OAC be full participants in the development of any plan to incorporate chiropractic health care services into the medical care facilities of the Armed Forces or as a health care service covered under the TRICARE program.

Since the inception of the CHCDP, the Congress clearly envisioned an active, fully engaged OAC that would be participating intimately in the development, conduct, analysis and reporting on this project. It was also the intent of the Congress to allow the OAC to participate in the preparation of the final report to the Congress by the statutory deadline of January 31, 2000.

Despite this clear, consistent, and sustained Congressional mandate for the OAC in the program, the authors of this report must inform the Congress that such intimate participation by the Doctor of Chiropractic members on the OAC in the data analysis and report preparation phases of the CHCDP was sporadic at best. In fact, with rare exceptions, over the past 20 months, the overwhelming majority of the participation by OAC Doctor of Chiropractic members in the conduct, development, and evaluation of the CHCDP, has essentially been relegated to responding to draft analyses and conclusions reached by the Department of Defense's consultants at the firm of Birch & Davis, rather than direct participation in the analysis of data, the implementation of the CHCDP at the 13 authorized sites, or the preparation of the remarks contained in the Final Evaluation reports. This "passive" and effectively non-participatory role played by the OAC Doctors of Chiropractic

is clearly inconsistent with Congressional intent as reflected in the statutes that have governed the CHCDP since its inception in 1994.

Although the Doctor of Chiropractic members of the OAC have expressed many of these concerns to key Members of Congress and their staffs over the past three years, our deepest concerns about the lack of direct participation by OAC Doctors of Chiropractic were realized when the vast majority of data analysis and review were completed by the DoD and its consultants at Birch & Davis. Although the Birch & Davis final report alludes to full and open participation by OAC members, including involvement in the evaluation of the CHCDP, our opportunity to participate was severely constricted to inordinately short comment periods and our concerns about advisability of integrating chiropractic care into the MHS have been largely ignored. OAC Doctor of Chiropractic members were also excluded from contributing to the conclusion section of the DoD report until release of the Birch & Davis report.

Correspondence in 1999 from the Chief Operating Officer of the TRICARE Management Activity to the Doctors of Chiropractic serving on the OAC, coupled with a clear message expressed during a July, 1999 conference call, clearly illustrate the DoD's resistance to the active, direct participation of the Doctor of Chiropractic members of the OAC in the data analysis and report writing of the CHCDP. A July 22, 1999 letter to one Doctor of Chiropractic member on the OAC from the Chief Operating Officer of the TRICARE Management Activity clearly stated the Department's position that Doctor of Chiropractic members of the OAC cannot be delegated a role in the conduct of the demonstration program. The letter also asserted that Doctor of Chiropractic members of the OAC could not participate in the analysis of data or preparation of reports despite the clear statutory mandate by the Congress that the OAC actively participate in all of these functions. Additionally, the letter clearly reflects the view of the Department that, despite Congressional requirements to the contrary, the OAC was to merely respond to DoD and its consultants' work products-- not participate actively in their preparation. A request by the Doctors of Chiropractic serving on the OAC for an emergency meeting to discuss these and other concerns was rejected by the Department. This rejection came despite support for this proposed meeting from Senator Strom Thurmond, a senior Member of the Senate Armed Services Committee, and the sponsor of Section 731 of the 1995 National Defense Authorization Act that created the original CHCDP.

Finally, as a result of OAC and Congressional pressure, only one Doctor of Chiropractic member of the OAC was provided direct access to information regarding the design and implementation of the final evaluation plan for the CHCDP developed by the Birch & Davis consultative team. This member was required to sign a confidentiality agreement in February, 1999 and was instructed not to inform, communicate, or divulge information relative to the final evaluation plan of the CHCDP to any other members of the OAC. This unfortunate action taken by DOD to effectively isolate the OAC from the Department's consultants on the CHCDP was perhaps the most serious indicator that the Department had no intention of including the OAC in the intimate details of the program.

Despite the persistent lack of compliance with the clear intent of Congress regarding the OAC participation in the conduct, data analysis, and report preparation phases of the CHCDP, the Doctor of Chiropractic members on the OAC were finally presented with the DoD consultants' initial draft of their final report just prior to Thanksgiving 1999 and were given until December 7th to provide any comments or other input on the consultants' findings. This was the first opportunity for OAC Doctor of Chiropractic members to review the Birch & Davis draft report and to formally respond to the methodologies and data analyses utilized by the consultants in reaching their conclusions on the CHCDP. A letter was submitted to the Chief Operating Officer of the TRICARE Management Activity of the DoD on December 1 outlining a brief overview of concerns and proposed changes to the final draft report. We, the chiropractic members of the OAC, identified numerous shortcomings and inconsistencies in the initial Birch & Davis draft that needed to be corrected. Subsequently, on February 23, 2000, we received a revised version of the Birch & Davis final report with only one work week allowed for review and submission of additional comments. While some of our initial suggestions were accepted and have been incorporated into the revised Birch & Davis report, others, particularly those related to the Birch & Davis cost analysis and advisability of integrating chiropractic health care into the MHS, have been ignored. Thus, we continue to express our deepest concerns that we were not afforded sufficient opportunity to be involved. The input sought by the Department in the final days of the CHCDP review process was insufficient and should have been sought and incorporated in the CHCDP from 1994 through the preparation of the final report to Congress.

We, therefore, urge the Congress to give weight to the views expressed in our current report regarding the CHCDP, and to reinforce its statutory requirement that the OAC actively participate in the implementation plan phase of the mandates contained in Section 702 of the fiscal year 2000 National Defense Authorization Act. We are grateful for this opportunity to provide our views regarding the Department of Defense report to Congress on the results of the Chiropractic Health Care Demonstration Program.

SECTION III

FINDINGS CONCURRENT WITH THE CHCDP REPORT

FINDINGS CONCURRENT WITH THE CHCDP REPORT

Finding #1: The results of the CHCDP clearly demonstrate that it is feasible to integrate chiropractic care into the military health care system. Perceptions and attitudes towards chiropractic care improved over time.

As cited in their final CHCDP report, Birch & Davis conclude that it is feasible to integrate chiropractic care into the military health system.[1] In their Executive Summary, Birch & Davis state that "An analysis of the data concludes that it is feasible to establish chiropractic services within the DoD…The CHCDP has shown that chiropractic services can be implemented within the DoD and are feasible." They further conclude that:

- X Results of the survey data and referral patterns at each site suggest that traditional health care providers recognized the value of chiropractic care by their willingness to refer patients to chiropractic clinics. Perceptions and attitudes about the acceptance of Doctors of Chiropractic and the appropriateness of spinal manipulation to treat certain medical conditions were judged to be favorable by traditional providers.

- X Provider attitudes toward Doctors of Chiropractic changed positively over time. The ability of Doctors of Chiropractic was judged more favorably after their integration. The study found that among traditional providers, the perceived appropriateness of chiropractic care and the perceived abilities of Doctors of Chiropractic increased over time.

- X Analysis of data collected from patients and providers indicates that chiropractic care was well received by the patient population. Overall, patients responded more favorably to chiropractic treatment than they did to traditional medical care.

- X Chiropractic service appears to have complemented and augmented traditional medical care. Enhanced readiness and the likely benefit of improved retention rates provide additional support for the advisability of integrating chiropractic care into the MHS.

[1]Birch & Davis Associates, Inc. *Final Report: Chiropractic Health Care Demonstration Program*, Falls Church, VA, February 10, 2000.

- X The CHCDP did not result in any adverse medical care or patient perceptions that would contraindicate the feasibility of offering chiropractic care to DoD beneficiaries throughout the military health system.

- $ The study results indicate that facilities were established and fully operational within 60 to 90 days. At each of the selected sites, chiropractic health care services were not constrained by contracting issues, physical space, or the ability to procure appropriate equipment.

- $ Start-up costs ranged from approximately $20,000 to $90,000 at each site, including the costs for facility modifications and equipment loans, leases, and purchase.

- $ No insurmountable issues delayed or prevented the establishment of chiropractic services at the 13 demonstration sites.[2]

The CHCDP has, therefore, clearly shown that chiropractic services can be successfully implemented within the military health care system. Initiating chiropractic care within the DoD is feasible.

Finding #2: Levels of patient satisfaction with chiropractic care during the CHCDP were high and significantly better than those reported for traditional medical care.

An important factor to determining the advisability of chiropractic care in the military is patient satisfaction with that care. To this end, data on patient satisfaction compiled from the "Four Week Follow-Up" Survey that was included in the CHCDP were re-analyzed. Differences in the levels of satisfaction for persons receiving chiropractic care and traditional medical care were examined. As is illustrated below, patients receiving chiropractic care reported significantly higher levels of satisfaction than did patients treated by traditional medical practitioners.

One of the important questions involving level of satisfaction with medical care asked lower back pain patients how they judged their improvement following treatment. Responses are presented in Table 1. At four weeks following treatment, 81.5 percent of those who visited a Doctor of Chiropractic rated their satisfaction with their improvement as "excellent" compared to only 55.6 percent of those who received care from traditional medical providers. At the other end of the spectrum, patients treated by Doctors of Chiropractic were nearly 5

[2]Ibid.

times less likely to rate their satisfaction level as "poor" in comparison with patients seen by traditional medical practitioners.

Table 1

How satisfied are you with improvement in your condition? (four week survey)

	Chiropractic	Traditional
Excellent	81.5%	55.6%
Somewhat	13.8%	22.9%
Poor	4.6%	21.5%

CHCDP participants were also asked several other questions regarding satisfaction with their medical care. To each of these questions, experiences with chiropractic care were rated significantly higher by respondents than was traditional medical care. For example, as shown in Table 2, a higher proportion of patients receiving chiropractic treatment rated their practitioner's willingness to spend time with them as "excellent" (93.7%) than was true for patients treated by other providers (77.5%). Likewise, fewer chiropractic patients rated their practitioner's willingness to spend time with them as "poor" (1.2% vs. 6.1%).

Table 2

How satisfied are you with the practitioner's willingness to spend time with you? (four week survey)

	Chiropractic	Traditional
Excellent	93.7%	77.5%
Somewhat	5.0%	16.4%
Poor	1.2%	6.1%

Similar patterns are evident in patients' responses to questions on their perceptions of explanations of their treatment (Table 3), access to care (Tables 4 and 5), and amount of time spent at the clinic waiting for treatment (Table 6). In each instance, chiropractic care was rated higher, better, or more satisfactory than care received from traditional medical providers.

Table 3

How satisfied are you with the explanation of your treatment? (four week survey)		
	Chiropractic	Traditional
Excellent	95.1%	81.1%
Somewhat	3.9%	13.6%
Poor	0.9%	5.3%

Table 4

How satisfied are you with the ease of making appointments? (four week survey)		
	Chiropractic	Traditional
Excellent	91.4%	71.6%
Somewhat	6.0%	15.0%
Poor	2.6%	13.4%

Table 5

How satisfied are you with the length of time you waited to get an appointment? (four week survey)		
	Chiropractic	Traditional
Very Satisfied	92.0%	72.1%
Somewhat	5.5%	15.5%
Very Dissatisfied	2.5%	12.5%

Table 6

How satisfied are you with the waiting time in the clinician's office? (four week survey)		
	Chiropractic	Traditional
Very Satisfied	95.0%	75.4%
Somewhat	4.1%	15.5%
Very Dissatisfied	0.9%	9.0%

These response patterns clearly show that chiropractic care patients are more satisfied with their care than are patients who received traditional medical treatment. On each of the measures, the level of satisfaction is much higher for chiropractic care. A higher proportion of patients receiving chiropractic care reported greater satisfaction with their improvement and their providers compared to patients receiving care from traditional providers.

Improving quality of life for military personnel was recently cited by Rudy de Leon, Undersecretary of Defense for Personnel and Readiness, as a major goal within the DoD.[3] Among the health-related issues that DoD intends to address is improving access to care. Improved access to health care, which is directly correlated with patient satisfaction, is seen as a mechanism to enhance the quality of military life, raise morale, and, thereby, increase retention. Integrating chiropractic care into the military health system is, therefore, an important step towards achieving these objectives.

Finding #3: Findings from the CHCDP indicate that personnel who utilized chiropractic care for the treatment of lower back pain experienced superior patient outcomes compared to patients who received more traditional types of care.

One of the keys to determining the advisability of including chiropractic care in the military health care system is patient outcomes. The best way to assess outcomes from patient visits is to judge the success of the treatment. To this end, the "Four Week Follow-Up" Survey collected information from patients about the outcomes of their visits to Doctors of Chiropractic and traditional medical practitioners. Level of activity and duty restriction data were compared for chiropractic patients and those of other providers. As is evident in these tables, a clear pattern of responses emerges. On every question, a higher proportion of

[3]Linda Kozaryn, Defense Leaders Champion Troop Needs, Armed Forces Press Service, January 10, 2000.

patients receiving chiropractic care reported better outcomes than did patients treated by traditional medical practitioners.

Table 7 describes how patients felt four weeks after treatment. As can be readily seen, nearly half (48.5%) of the patients who were treated by Doctors of Chiropractic reported no restrictions four weeks after receiving their treatment versus one-third (32.1%) of those who were treated by traditional providers. Similarly, a smaller proportion of patients who received chiropractic care (44.1%) reported feeling "somewhat restricted" compared to those treated by traditional providers (50.0%). For those who reported feeling "very restricted," the pattern of responses is most telling. Nearly 18 percent of respondents who received care from traditional providers responded that they felt "very restricted" four weeks after treatment versus 7.4 percent for chiropractic patients. Thus, patients who were treated by traditional providers were nearly two and one-half times more likely to report feeling "very restricted" at four weeks post-treatment.

Table 7

What best describes you today? (four week survey)		
	Chiropractic	Traditional
Not Restricted	48.5%	32.1%
Somewhat	44.1%	50.0%
Very Restricted	7.4%	17.9%

The response pattern shown in Table 7 is repeated in Tables 8 and 9. In Table 8, the proportion of patients who reported no restrictions is 28 percent greater for those who were treated by a Doctor of Chiropractic (73.4% vs. 52.9%). Likewise, a smaller proportion of patients receiving chiropractic care (19.2%) reported their current level of activity as "somewhat restricted" four weeks after treatment than was the case for patients treated by traditional providers (29.4%). Among respondents who stated that their level of activity was "very restricted," a much lower proportion of respondents were chiropractic patients. In addition, the percentages (7.4% vs. 17.7%) are nearly identical with the results presented in Table 7 on how patients felt four weeks after treatment.

Table 8

What is your current level of activity? (four week survey)		
	Chiropractic	Traditional
Not Restricted	73.4%	52.9%
Somewhat	19.2%	29.4%
Very Restricted	7.4%	17.7%

Participants in the "Four Week Follow-Up" Survey were queried as to whether their lower back problem currently limited their performance. The results are presented in Table 9. Table 9 shows that a much higher proportion of patients who received chiropractic care reported no limitations on their performance compared to those receiving care from traditional medical practitioners (73.2% vs. 53.3%). Nearly 47 percent of patients receiving traditional medical care reported at least some performance limitations four weeks after treatment compared to 27 percent of patients seen by a Doctor of Chiropractic. Additionally, patients treated by traditional medical practitioners were more than twice as likely to definitively report that there performance was limited than were patients receiving chiropractic care (20.9% vs. 9.5%).

Table 9

Do your problems limit your performance? (four week survey)		
	Chiropractic	Traditional
No	73.2%	53.3%
Somewhat	17.3%	25.9%
Yes	9.5%	20.9%

When asked whether they felt better now, a clear difference is evident in the response patterns of patients receiving chiropractic care compared to patients treated by traditional medical providers (Table 10). Over three quarters (78.5%) of respondents who saw a Doctor of Chiropractic strongly agreed with the statement that they felt better now compared to half (49.2%) of those who were treated by a traditional provider. Also, the proportion of chiropractic

patients who strongly disagreed that they felt any better four weeks after treatment is much smaller (6.9%) than the proportion receiving traditional medical care (28.8%).

Table 10

I feel better now (four week survey)		
	Chiropractic	Traditional
Strongly Agree	78.5%	49.2%
Somewhat	14.6%	22.0%
Strongly Disagree	6.9%	28.8%

Table 11 presents data on patients' self-reported assessments of the results of their treatment. As shown in Table 11, 82.9 percent of the patients who were treated by a Doctor of Chiropractic reported good results from the treatment compared to 50.7 percent of patients served by traditional medical providers. On the other hand, the proportion of patients receiving chiropractic care who felt they did not receive good treatment was very low (4.6%), much lower than the 24.6 percent of patients receiving care from traditional providers who did not feel they received positive outcomes from their treatment.

Table 11

I had good results from the treatment? (four week survey)		
	Chiropractic	Traditional
Strongly Agree	82.9%	50.7%
Somewhat	12.6%	24.8%
Strongly Disagree	4.6%	24.6%

As part of the "Four Week Follow-Up" Survey, CHCDP participants were asked about whether their pain was worse now than when their treatment began. As shown in Table 12, at four weeks following treatment, a smaller proportion of chiropractic patients strongly agreed that their pain was worse now compared to patients who received traditional medical care (4.4% versus 9.9%). Additionally, among patients treated by a Doctor of Chiropractic, a higher

proportion (88.0%) strongly disagreed that their pain was worse four weeks after treatment than was the case among patients who were treated by traditional medical providers (70.5%).

Table 12

The pain is worse now (four week survey)		
	Chiropractic	Traditional
Strongly Agree	4.4%	9.9%
Somewhat	7.6%	19.6%
Strongly Disagree	88.0%	70.5%

Among the better indicators of treatment outcome for persons who have suffered from lower back pain are the number of days of work missed (Table 13) and the number of days on restricted duty (Table 14) as ordered by their authorized medical provider. On both of these measures, chiropractic care surpassed treatment by traditional providers.

As shown in Table 13, 87.1 percent of patients who saw a Doctor of Chiropractic lost no duty time and only 3.3 percent missed more then one week. For traditional providers, 66.1 percent of patients had no lost duty time and 8 percent missed more then one week. Patients treated by Doctors of Chiropractic averaged less than one missed day due to their medical condition (0.69 days) while patients who received care from traditional providers missed an average of 1.71 days as a result of their medical condition.

Table 13

Days off duty (four week survey)		
	Chiropractic	Traditional
0	87.1%	66.1%
1 to 4	9.6%	25.8%
5 and up	3.3%	8.0%

Approximately 72 percent of patients receiving chiropractic care reported zero restricted duty days due to their medical condition (Table 14). For personnel treated by traditional providers, the corresponding proportion was 51.1 percent. Approximately 30 percent of chiropractic patients reported restricted duty time, with 24.3 percent having restrictions in excess of one week. For those who received care from traditional providers, 48.9 percent reported restricted duty time resulting from their medical condition and over 40 percent were on restricted duty for more than one week.

Table 14

Days on restricted duty (four week survey)

	Chiropractic	Traditional
0	71.5%	51.1%
1 to 4	4.2%	8.2%
5 and up	24.3%	40.7%

As can be seen from these findings, outcomes were much better for chiropractic care than for traditional medical care. A higher proportion of patients treated by Doctors of Chiropractic said they felt better, reported less pain than previously, and had fewer physical restrictions and limitations than patients receiving care from traditional providers. Chiropractic patients also reported fewer days away from work or on restricted duty due to their medical problems. Thus, the re-examination of "Four Week Follow-Up" Survey data confirms the efficacy of chiropractic care in the military health care system.

Finding #4: Results from the CHCDP highlight the implications for enhanced readiness that arise from the use of chiropractic care. Additionally, enhanced readiness may also lead to increased retention of military personnel.

We concur with the findings from the Birch & Davis final report that military personnel who receive chiropractic care are more likely to return to work faster and spend less time on restricted duty than personnel who receive traditional medical care. More specifically, patients treated by Doctors of Chiropractic for lower back pain are, on average, likely to return to work more quickly than a patient who received care from a traditional provider. Similarly, patients treated by Doctors of Chiropractic spent, on average, fewer days on restricted duty. We agree with the Birch & Davis conclusion that "the total effect of

chiropractic care on active duty time availability would likely range between 111,000 and 331,000 additional duty days per year, with a central value of about 199,000" (p. IV-31--includes both lost duty and restricted duty days).

The Birch & Davis final report asserts that, "Chiropractic care is associated with improved outcomes in time availability of active duty, reduced inpatient admissions by active duty, and reduced physical therapy visits" (p. IV-2). These findings serve as the basis for the contention that enhanced readiness is a direct product of chiropractic care.

Additionally, the DoD has identified improved access to health care as a major factor in improving the quality of life for military personnel. DoD recognizes that improving access to health care is directly associated with improved morale and, thereby, is a significant issue in increasing both readiness and retention.[4] While the Birch & Davis report does not attempt to correlate enhanced readiness with increased retention rates, they conclude that "Active duty beneficiaries clearly have a strong demand for chiropractic services, and this demand is strictly increasing with age" (p. IV-11). Given this finding, there is reason to believe that there may be a relationship between enhanced readiness and increased retention rates in the military if chiropractic care were integrated into the MHS. Enhanced readiness and the likely benefit of improved retention rates provide additional support for the advisability of introducing chiropractic care into the MHS.

Finding #5:Findings from the CHCDP indicate that spinal maladies remain a big problem for the military. Further, the Demonstration illustrates the inadequacy of the current care system to address this problem.

The Birch & Davis final report indicates that spinal maladies remain a big problem for the military. During 1994, Steven A. Meskin, Ph.D., F.S.A., M.A.A.A. analyzed the cost of implementing chiropractic benefits into a proposed national health care plan.[5] While the Meskin study does not focus exclusively on military personnel, it does provide insights into the most common diagnoses that Doctors of Chiropractic treat. Meskin estimated that of the 170 million non-elderly adults (ages 16-64) residing in the United States during 1992, 6.4 percent (10.9 million) received care from Doctors of Chiropractic. Of those individuals, 85 percent (9.3 million), were diagnosed with lower back pain. This study indicated that a large majority of non-elderly people who utilize chiropractic care are diagnosed with lower back pain.

4 Ibid.
5 Meskin, Stephen. *The Cost of Chiropractic Benefits.* May, 1994.

Using data contained in exhibits G51 and G61 of the Birch & Davis final report, we calculated that approximately 51.5 patients per thousand, or about 5 percent of all personnel enrolled in the MHS, will be treated for lower back pain during a year.[6]

This information, coupled with the Meskin study findings, indicates that spinal maladies remain a big problem for the military. Because of the large annual demand for medical treatment and assistance with conditions related to lower back pain in the MHS, some of the demand may be unmet. Introducing Doctors of Chiropractic to help serve this unmet demand will address the current inadequacies and lack of options for obtaining treatment for lower back pain in the MHS.

Conclusions Based on Findings 1 Through 5

Although we categorically reject the position by the DoD that the incorporation of chiropractic health care services into the MHS is not "advisable," the assessment of the CHCDP by Birch & Davis was overwhelmingly positive. Birch & Davis cited improvements in patient outcomes, improved acceptance of chiropractic by military health care providers, reduced inpatient admissions due to chiropractic treatment, and dramatic reductions in lost work days due to chiropractic health care services. Furthermore, a careful reading of the final report reflects the fact that the only apparent reason why the consultants did not recommend the 'advisability' of integrating chiropractic into the MHS was an overstated, erroneously-derived 'cost estimate' and manpower offsets. These arguments are refuted by the critique and additional information provided in the present report.

Therefore, we conclude the following:

1) The integration of chiropractic health care services into the MHS is both feasible and advisable, based on the data contained in the CHCDP final report;

2) The CHCDP clearly demonstrated a high level of patient satisfaction among all branches of the military;

3) The CHCDP revealed dramatic improvement in patient outcomes and, in the words of the Birch & Davis Associates' team, "patients who saw Doctors of Chiropractic were significantly more likely to show self-reported improvement in health over the four-week survey period than patients who saw traditional providers." Birch & Davis also found that patients were more likely to give their provider excellent marks (a perfect score) if they were seen by a Doctor of Chiropractic;

6 Number of patients per thousand= 298.5 per thousand visits (average of all ages groups) / 5.8 average visits for chiropractic= 51.48 visits per thousand.

4) Chiropractic health care services dramatically reduced the number of lost duty days among military personnel, thus increasing productivity and combat readiness;

5) The cost estimates attributable by the Birch and Davis team to chiropractic health care services in the MHS were dramatically overstated, with methodologies utilized that failed to assign cost savings to perhaps the most important data set in the CHCDP – a savings of at least 199,000 military labor days *per year* as a direct result of chiropractic care; and

6) Chiropractic care in the military may actually result in a net savings to the MHS, if factoring in those savings identified by the Birch and Davis consultant team, the 199,000 labor days saved, and other factors identified by the Doctors of Chiropractic on the OAC and their consultants at Muse & Associates.

Therefore, we conclude that full integration of chiropractic care into the MHS is fully justified and both feasible and advisable; will **not** have a negative effect on either aggregate MHS health care costs or medical manpower levels currently in effect; and will significantly enhance health care for the men and women of the Armed Forces.

SECTION IV

ADDITIONAL FINDINGS BY DOCTOR OF CHIROPRACTIC MEMBERS OF THE OAC

ADDITIONAL FINDINGS BY DOCTOR OF CHIROPRACTIC MEMBERS OF THE OAC

Our examination of "Four Week Follow-Up" Survey data indicates that chiropractic treatment leads to better outcomes, more satisfied patients, and less duty time lost. To assess the advisability of chiropractic care, it was also necessary to examine the cost implications of such care. This was accomplished by analyzing data from several sources. We began by analyzing information on military personnel and payrolls. We then examined Medicare data to assess whether access to chiropractic care results in cost savings.

Birch & Davis estimate that the cost to the MHS of an open benefit policy for chiropractic care would be $70 .9 million.[7] As discussed below in Additional Findings 1, 2, and 3, however, these costs will be reduced by offsets for recovered days, physical therapy, and other eliminated services. These cost offsets will result in annual net savings to the DoD of $25.8 million.

Additional Finding #1: The Birch & Davis report failed to complete the cost savings of chiropractic care to the MHS.

According to DoD, there were 1,252,000 people on active duty in 1996.[8] Personnel costs for active duty personnel totaled almost $38.4 billion.[9] To calculate the average annual personnel costs per person, we divided total personnel costs by the number of people on active duty. This resulted in average personnel costs per person of $36,353. The Birch & Davis final report states that average annual active duty pay is "approximately" $30,000 per person.[10] Assuming a standard work year of 260 days (5 days a week for 52 weeks), the average daily cost per person for active duty personnel is $139.82.

The Birch & Davis final report states that the reduction in time off active duty from the integration of chiropractic care would result in recovered duty days. The number of days that could be recovered ranges from 331,000 to 111,000, with a central value of 199,000.[11] These estimates of recovered days were multiplied by the average active duty daily personnel cost of $139.82. This results in recovered costs of between $46.8 million and $15.5 million. For

7 Birch & Davis Associates, Op. Cit., page IV-2.
8 U.S. Bureau of the Census, *Statistical Abstract of the United States (117th edition)*, Table 548, Washington, D.C., 1997.
9 Ibid.
10 Birch & Davis, *Final Report Chiropractic Health Care Demonstration Program,* page G-83.
11 Op. Cit., page IV-31.

the central value the estimated savings is $27.8 million. The cost estimate for the central value was used as the basis for all subsequent calculations.

Additional Finding #2: The Birch & Davis report underestimated the medical offsets associated with chiropractic care.

Analysis of "Four Week Follow-Up" Survey and related payroll data indicate that there would be significant cost savings if chiropractic care were integrated into the MHS. To confirm that cost differences exist between chiropractic and traditional medical treatment, we examined data for the Medicare population. The general demographic characteristics of the military and Medicare populations differ substantially. Our purpose in examining Medicare data is two-fold. First, if it can be shown that a pattern of cost differences between chiropractic and traditional care also occurs in the Medicare population, then one may conclude that such differences are due to the nature of the treatment received and not to the characteristics of the populations involved. Second, if Medicare payments are less for beneficiaries receiving chiropractic care, then the advisability of including chiropractic care in the MHS is supported.

The Medicare data presented in this report were compiled from HCFA's 1996 Medicare 5 Percent Standard Analytic File (SAF). The SAF files are based on all Medicare provider claims records submitted during a calendar year. The 5 Percent SAF was created by selecting a sample of records from the 1996 Medicare 100 percent claims file.

We begin with an analysis of baseline summary claims data for all Medicare-covered medical services utilized by beneficiaries with a primary diagnosis of lower back pain in 1996 irregardless of what type of provider delivered the medical services (Table 15). We then compare payment differences for beneficiaries who received chiropractic treatment versus traditional medical care, initially for their lower back pain claims only (Table 16) and then for all of their medical claims (Table 17).

Table 15 captures all of the Medicare payments for all medical services provided during 1996 to beneficiaries with a primary diagnosis of lower back pain. As shown in this baseline summary table, more than 5.4 million Medicare beneficiaries received a primary diagnosis of lower back pain during 1996. These individuals consumed nearly 187 million services, with Medicare payments totaling approximately $37 billion or an average of $6,807 per beneficiary.

Table 15

Baseline Summary of All Claims for Patients with a Primary Diagnosis of "Lower Back Pain"

File	Patients	Services	Paid	Percent of Total Paid	Average Paid per Patient
All Files	**5,424,840**	**186,779,600**	**$36,928,683,465**	**100%**	**$6,807**
DME	1,393,240	7,441,900	$874,454,200	2%	$628
Home Health	774,460	3,801,780	$3,341,614,676	9%	$4,315
Hospice	42,980	111,320	$205,360,352	1%	$4,778
Inpatient	1,505,320	2,757,160	$17,169,890,030	46%	$11,406
Hospital Outpatient*	4,246,140	23,624,880	$3,753,784,860	10%	$884
Professional*	5,404,960	148,400,320	$9,541,311,125	26%	$1,765
Nursing Facility	295,360	642,240	$2,042,268,222	6%	$6,915

*Hospital Outpatient refers to the facility. The Professional file includes physician claims and those of other practitioners.

Examination of the distribution of claims among the sub-files reveals that Medicare beneficiaries received their medical care in numerous provider settings and that the average payments per patient vary considerably by setting.

A fundamental flaw in the Birch & Davis cost analysis was their failure to examine total health care costs for individuals diagnosed and treated for lower back pain. The Birch & Davis analysis only looked at claims for lower back pain, accounting for approximately 10 percent of the total health care costs of those individuals participating in the demonstration. Thus, Birch & Davis omitted all but a small portion of the medical costs of military personnel diagnosed with lower back pain. As a result of this shortcoming, we divided our analysis of Medicare claims data into two parts. To maintain comparability with the Birch & Davis methodology, we first examined Medicare claims for lower back pain only. Then we analyzed all medical claims for Medicare beneficiaries with a primary diagnosis of lower back pain.

Our analysis of lower back pain claims only for Medicare beneficiaries with a primary diagnosis of lower back pain is summarized in Table 16. Comparing the data in Table 16 with the information in Table 15 indicates that claims for lower back pain constitute only 13 percent of all medical services consumed by Medicare beneficiaries with a primary diagnosis of lower back pain during 1996 and only 7 percent of their total Medicare payments.

Table 16

Summary of 'Lower Back Pain' claims only for patients with a diagnosis of 'Lower Back Pain'						
Patient Type	File	Patients	Services	Paid	Percent of Total Paid	Average Paid per Patient
Patient Not seen by Chiropractor	**All Files**	**3,900,720**	**14,151,400**	**$2,158,779,388**	**100%**	**$553**
	DME	194,720	464,800	$39,631,481	2%	$204
	Home Health	60,240	161,500	$131,826,485	6%	$2,188
	Hospice	40	140	$313,714	0%	$7,843
	Inpatient	132,700	148,920	$757,569,963	35%	$5,709
	Outpatient	1,375,760	2,462,040	$362,987,992	17%	$264
	Professional	3,559,400	10,887,600	$784,617,870	36%	$220
	SNF	16,560	26,400	$81,831,882	4%	$4,942
Patient seen by Chiropractor	**All Files**	**1,524,120**	**10,658,340**	**$467,421,674**	**100%**	**$307**
	DME	20,640	40,960	$2,981,232	1%	$144
	Home Health	5,380	12,480	$8,504,182	2%	$1,581
	Inpatient	15,500	17,420	$97,155,291	21%	$6,268
	Outpatient	179,820	331,140	$49,874,563	11%	$277
	Professional	1,523,080	10,254,920	$304,241,502	65%	$200
	SNF	1,080	1,420	$4,664,904	1%	$4,319

Of greater interest, however, is the difference in average payments between Medicare beneficiaries treated by a Doctor of Chiropractic and those seen by other provider types. The average Medicare payment for beneficiaries receiving chiropractic treatment ($307) was significantly lower than the average payment to other providers ($553). The average Medicare payment for chiropractic services to treat lower back pain was 55 percent of the average payment to traditional medical care providers. With two exceptions (outpatient hospital setting and inpatient setting), average payments for chiropractic care were lower than average payments to traditional medical providers for the treatment of lower back pain.

The Birch & Davis analysis disregarded the overwhelming majority of health care costs for persons participating in the CHCDP. By failing to examine the total health care costs of persons with a primary diagnosis of lower back pain, a significant amount of information was excluded. Consideration of such information could lend further support to the issue of advisability.

Summary data for all claims for Medicare beneficiaries with a primary diagnosis of lower back pain are presented in Table 17. Similar to our analysis of lower back pain claims only (Table 16), total Medicare payments for beneficiaries who were treated by a Doctor of Chiropractic for their lower back pain were, on average, lower than corresponding payments for beneficiaries who received treatment for their lower back pain from traditional provider types ($4,079 versus $7,873). Average Medicare payments for all medical claims for persons with a primary diagnosis of lower back pain were only half as great for beneficiaries

receiving chiropractic care compared to traditional medical treatment for their lower back pain. The differences are repeated for each provider setting.

Table 17

Summary of all claims for patients with a primary diagnosis of 'Lower Back Pain'

Patient Type	File	Patients	Services	Paid	Percent of Total Paid	Average Paid per Patient
Patient not seen by Chiropractor	**All Files**	**3,900,720**	**140,959,560**	**$30,711,688,607**	**100%**	**$7,873**
	DME	1,119,940	6,282,280	$746,010,192	2%	$666
	Home Health	665,840	3,407,980	$3,037,275,557	10%	$4,562
	Hospice	37,540	97,860	$181,662,240	1%	$4,839
	Inpatient	1,226,820	2,310,720	$14,367,520,945	47%	$11,711
	Outpatient	3,177,460	18,668,620	$3,057,440,586	10%	$962
	Professional	3,880,840	109,612,080	$7,469,368,074	24%	$1,925
	SNF	260,300	580,020	$1,852,411,014	6%	$7,116
Patient seen by Chiropractor	**All Files**	**1,524,120**	**45,820,040**	**$6,216,994,859**	**100%**	**$4,079**
	DME	273,300	1,159,620	$128,444,008	2%	$470
	Home Health	108,620	393,800	$304,339,119	5%	$2,802
	Hospice	5,440	13,460	$23,698,111	0%	$4,356
	Inpatient	278,500	446,440	$2,802,369,086	45%	$10,062
	Outpatient	1,068,680	4,956,260	$696,344,274	11%	$652
	Professional	1,524,120	38,788,240	$2,071,943,051	33%	$1,359
	SNF	35,060	62,220	$189,857,208	3%	$5,415

Analysis of Medicare claims data indicates that, irregardless of whether one examines all payments or restricts the analysis to just lower back pain claims, chiropractic care is less expensive than traditional medical care. Chiropractic care also results in lower overall health care costs among Medicare beneficiaries. From these results, one can infer that integrating chiropractic care into the MHS will save money. These findings support an unconditional and unconstrained advisability of adding chiropractic care to the MHS.

The next step is to calculate the total cost recovered through the substitution of chiropractic care for traditional care. The Birch & Davis final report states that the average person will use 0.2 emergency room (ER) visits, 0.7 primary care physician visits and one physical therapy (PT) visit per episode of back pain, or they will go to see a Doctor of Chiropractic.[12] This creates the substitution effect of replaced PT visits discussed in the Birch & Davis final

12 Op. Cit., page IV-13.

report. Birch & Davis estimate that there would be 330,340 fewer PT visits if chiropractic care was available to military personnel.[13]

Birch & Davis attributed a cost of $57.43 to each PT visit.[14] Simple multiplication of the cost of a PT visit by the estimate of the number of saved PT visits results in $18.9 million in savings to the MHS.[15] Next we added the cost savings from fewer ER and primary care visits by multiplying the numbers by their respective costs. This results in total savings of $50.9 million. These cost effects are illustrated in Table 18.

Table 18

Physical Therapy Substitution Effect*	
Average Cost Per Visit	
ER	$122.66
Primary Care	$102.99
Physical Therapy	$57.43
Chiropractic Care	$56.76
Calculations	
Saved PT Visits	330,340
CHCDP Physical Therapy Costs Savings Only	$ 18,973,350
CHCDP Report Average Number Of ER/Primary Care/PT Visit Costs	$ 50,890,520
*Source: Birch & Davis Report, page IV-10, IV-13, and IV-21.	

Birch & Davis concluded that there would be $6.7 million in cost savings associated with a reduction in inpatient care.[16] Using a proportional allocation based on our analysis of the Medicare data, we estimate that there would be additional savings of $11.3 million from other services (Table 19). Thus, the savings that would accrue from substituting chiropractic care for traditional medical treatments would be $18 million. The $11.3 million of cost savings for these other services were neither calculated nor reported in the Birch & Davis report.

13 Op. Cit.,page IV-21.
14 Op. Cit., page IV-10.
15 Ibid.
16 Birch & Davis, Op. Cit., p. IV-33.

Table 19

Eliminated Services and Associated Savings for Chiropractic Services			
	5% SAF Charges	*CHCDP Savings*	
DME	$628.00	$368,893.56	2.0%
Home Health	$4,315.00	$2,534,674.73	14.1%
Hospice	$4,778.00	$2,806,645.63	15.6%
Outpatient	$884.00	$519,270.56	2.9%
Professional	$1,765.00	$1,036,778.89	5.8%
SNF	$6,915.00	$4,061,941.08	22.5%
Subtotal	***$19,285.00***	***$11,328,204.45***	***62.8%***
Inpatient	$11,406.00	$6,700,000.00	37.2%
Total	***$ 30,691.00***	***$18,028,204.45***	***100.0%***
*CHCDP inpatient amount from Birch and Davis Report, page IV-33.			

Additional Finding #3: The Birch & Davis report underestimated the total savings of integrating chiropractic care into the MHS.

Four steps are involved in estimating the total cost savings of integrating chiropractic care into the MHS. The first step involves calculating the savings that would result from the recovered days of active duty identified and discussed in the Birch & Davis final report. The second step involves addressing the absence of primary care physician and ER visit costs in the recovered cost of physical therapy. The third step is to calculate the value of other medical services that would be eliminated along with inpatient treatment and the fourth step is to apply these savings against the Unconstrained Demand Open Benefit model, which was the most expensive benefit design included in the CHCDP.

The cost to the military of an open benefit policy for chiropractic care was calculated by multiplying the average cost per chiropractic visit ($56.76 - Table 18) as calculated by Birch & Davis by the projected estimate of the number visits (1,249,589). This would result in $70.9 million in costs to the MHS. However, these costs will be reduced by the offsets discussed above.[17] When we subtract the savings calculated above from the estimate of the cost of chiropractic care derived from the most expensive benefit model developed used in the CHCDP, we find that these cost offsets produce a net savings to the DoD of $25.8 million (Table 20).

17 The use of 330,340 as the total number of physical therapy visits that will be eliminated is based upon the MHS-Wide Basis Using Model which is not the most expensive model in the CHCDP Report. The cost of implementing chiropractic care in the MHS with the Wide Basis Using Model is based upon a projected use of 984,126 visits at a cost of $55.9 million. CHCDP Report, page IV-21.

Table 20

Annual Net Savings To DoD		
Cost	***Components***	***Source***
$70,926,671.64	Unconstrained Demand Open Benefit	B&D Report Page IV-2
$27,824,195.08	Central Range Recovered Days Savings (N=199,000)	B&D Report Page IV-2
$18,028,204.45	Total Eliminated Charges With Chiropractic Services	Table 19 (above)
$50,890,528.70	Total Saved Charges From Physical Therapy Substitution	Table 18 (above)
$25,816,256.59	***Annual Net Savings To DoD***	

SECTION VI

RECOMMENDATIONS

RECOMMENDATIONS

In view of the conclusions reached earlier in this report, including cost savings attributable to chiropractic in the military, coupled with the overwhelmingly positive benefits of chiropractic care cited by the Department's own Birch & Davis consultant team, we are pleased to propose the following specific recommendations to be carried out by the Committees on Armed Services and the full Congress, to begin the process of full integration of chiropractic into the MHS:

1) The implementation plan requirement contained in Section 702 of the National Defense Authorization Act, Fiscal Year 2000 (Public Law 106-65), should be triggered and the DoD should be required to begin development of the implementation plan as envisioned by the Committees on Armed Serviced during 1999.

2) By no later than January 31, 2001, the Secretary shall have developed the implementation plan to incorporate chiropractic into the MHS, and reported such plan to the Defense Committees of the House of Representatives and the U.S. Senate.

3) In carrying out the development of the implementation plan, the Secretary of Defense shall personally ensure that Doctors of Chiropractic who serve on the OAC are intimately engaged with DoD in the preparation of the implementation plan.

4) The current level of chiropractic health care benefits at the statutorily-required thirteen sites shall be continued indefinitely, at level of service currently being provided at these sites.

5) The implementation plan described above shall include, at a minimum, the following components –

   (a) full integration of chiropractic health care services into the MHS, but phased into the MHS as follows:

      (i) Phase I: All active duty personnel, with particular emphasis on providing chiropractic services where the impact on combat readiness will be most significant, by no later than October 1, 2001:

(ii) Phase II: All active and non-active duty personnel receive chiropractic health care services by no later than October 1, 2002; and,

(iii) Phase III: All active, non-active duty personnel and their dependents receive chiropractic health care services by no later than October 1, 2003.

(b) Direct access to chiropractic health care services by men and women of the Armed Forces;

(c) Chiropractic health care services shall be provided at all military health care facilities;

(d) Full scope of practice, defined as follows:

Doctors of Chiropractic are trained and educated at chiropractic colleges accredited by the Council on Chiropractic Education (recognized as an accrediting agency for chiropractic education by the U.S. Department of Education). Their scope of practice extends well beyond treatment and incorporates broad patient evaluation and diagnostic components, as well as the following services –

(i) Primary contact, screening, and coordination of care services;

(ii) Diagnostic testing and imaging, including differential diagnosis, with the accompanying ability to perform and/or order as well as interpret diagnostic tests, including venipuncture;

(iii) Ordering and interpretating diagnostic imaging, electro-diagnostic testing, and laboratory analysis;

(iv) Manipulation/adjustment services and a range of other manual and physical therapeutic procedures, including daily living instructions, ergonomics, and exercise/rehabilitation and counseling; and

(v) Nutritional counseling, including advice on vitamins and food supplements.

Note: Prescriptive drugs and surgery are outside a Doctor of Chiropractic's scope of professional practice.

(e) Doctors of Chiropractic operating with the same, full hospital privileges and credentials authorized for physicians in the MHS and TRICARE.

(f) Chiropractic health care services provided through a variety of mechanisms, including but not limited to: contract employees and Doctors of Chiropractic serving as Commissioned Officers.

(g) Establishment of a Chiropractic Health Care Policy Board to assist and advise the Assistant Secretary for Health Affairs and the Secretary of Defense on the implementation of the chiropractic integration plan and all subsequent administration of the chiropractic health care benefit program. Such Board shall also serve as a policy-making authority within the Department of Defense for chiropractic health care services and benefits in the military.

(h) Establishment of a chiropractic education and training program to be available to all military health care providers, administrators, and support personnel within the military health system, including TRICARE, to assist in the assimilation of chiropractic health care services into the mainstream of all health care services provided to the Armed Forces. Such education and training program shall be carried out by, among others, the colleges and universities that comprise the Association of Chiropractic Colleges.

(i) Stringent reporting requirements shall be imposed on the Department of Defense, to ensure that they report on a regular, detailed basis on the implementation and administration of the chiropractic health care benefits program in the MHS, including a requirement that the General Accounting Office monitor and report on the chiropractic health care benefit program on a regular, ongoing basis to the Congress and the Department.

APPENDIX A

BACKGROUND RESEARCH ON CHIROPRACTIC CARE

BACKGROUND RESEARCH ON CHIROPRACTIC CARE

Within the past 100 years, chiropractic has become the third-largest profession of healthcare delivery in the world. The American Chiropractic Association defines chiropractic as, "a branch of the healing arts that is concerned with human health and disease processes. Doctors of Chiropractic are physicians who consider man as an integrated being, but give special attention to spinal mechanics, neuromusculoskeletal, neurological, vascular, nutritional, and environmental relationships." (ACA Master Plan, ratified by the House of Delegates June 1964, amended June 1979.)[1]

According to the Association of Chiropractic Colleges, chiropractic is defined as "a healthcare discipline that emphasizes the inherent recuperative ability of the body to heal itself without the use of drugs or surgery." In practice, chiropractic "focuses on the relationship of structure [primarily the spine] and function [as coordinated by the nervous system] and how that relationship affects the preservation and restoration of health."[2]

Chiropractic's focus on the principles of holism have gained it a wide public following among alternative medical procedures (with utilization rates ranging between 11 percent[3] and 15.7 percent[4] of the U.S. population). Interest in less-invasive interventions and natural healing is demonstrated by the rapidly growing number of Americans visiting alternative health providers, rather than allopathic physicians.[1,3]

Chiropractic is recognized and licensed in every state and province in North America, as well as in 76 nations representing the European, Asian, Latin American, Caribbean, Eastern Mediterranean, and Pacific domains.[6] The increasing acceptance of chiropractic as mainstream healthcare is clear, an acceptance that has grown in tandem with greater emphasis on research by professional organizations and colleges. It also stems from rigorous standards for accrediting and review of educational curricula at chiropractic colleges around the world, 16 of which are accredited in the United States by the Council for Chiropractic Education (CCE). The CCE has had accrediting agency status with the U.S. Department of Education since 1974, and with the Council on Postsecondary Accreditation since 1976. The minimum number of hours required for CCE accreditation is 4,200, ranging from 4,400 to 5,220 hours at colleges nationwide.[5] In fact, the didactic basic science and clinical science hours among chiropractic colleges around the United States is nearly the same as the corresponding averages obtained from medical schools nationwide.[7]

With more than 65,000 licensed practitioners in the United States, chiropractic is the foremost profession through which spinal manipulation/adjustment is administered—largely in the treatment of back pain but increasingly for other neuromusculoskeletal disorders and for non-neuromusculoskeletal conditions as well. It has been estimated that the total number of chiropractic office visits nationwide each year is 250 million,[8] with 94% of all spinal manipulations/adjustments administered by Doctors of Chiropractic.[9]

PATIENT OUTCOMES

Over 40 randomized clinical trials have been published comparing spinal manipulation/ adjustment with other treatments for low-back pain. The better-quality clinical trials have indicated that spinal manipulation/adjustment is superior to other types of intervention (corsets, massage, mobilization, back education, physiotherapy, acupuncture) or at least as effective as NSAIDs—[10-19] but without the side effects of NSAIDs, which have been shown to affect no fewer than seven organ systems (gastrointestinal, hepatic, renal, hematologic, cutaneous, respiratory, and central nervous system), sometimes fatally.[20,21] These findings have been given additional weight by at least two meta-analyses published in peer-reviewed medical journals, unequivocally supporting the effectiveness of spinal manipulation/adjustment in treating acute low-back pain in the absence of radiculopathy.[22,23]

PATIENT SATISFACTION AND COST-EFFECTIVENESS

In addition to improved patient outcomes, an integral part of evaluating the use of any healthcare modality is its cost. Chiropractic care has been found to be a superior treatment option and demonstrates lower costs.[24] This pattern is consistently observed from the perspectives of workers' compensation studies,[25-30] databases from insurers,[31-33] and other health economists .[34,35] Some studies have suggested the opposite [that chiropractic services are more expensive than medical services],[36,37,39] but these studies contain significant refuted flaws. [28,38]

The cost advantages for chiropractic for matched conditions appear to be so dramatic that Pran Manga, a prominent Canadian health economist, has concluded in a study commissioned by the Canadian National Government (Ontario Ministry of Health) that doubling the utilization of chiropractic services from 10 percent to 20 percent may realize savings as much as $770 million in direct costs and $3.8 billion in indirect costs.[35] Furthermore, in no cost studies to date have either iatrogenic or legal burdens been calculated, which suggests advantages for chiropractic health care.

Patient satisfaction with chiropractic treatment has also invariably been shown to be abundantly greater than that found with conventional management.[39,40] Satisfied patients are far more likely to be compliant in their treatment,[41] giving Doctors of Chiropractic yet another advantage over other professionals in terms of improved patient outcomes.

APPROPRIATENESS AND GUIDELINES

Spinal manipulation/adjustment has also excelled in experimental designs bearing great clinical significance beyond randomized trials. Panels convened by the RAND Corporation,[42,43] as

well as field practitioners' utilization studies,[44] have provided additional clinical support to that found in randomized clinical trials of spinal manipulation/adjustment for the management of low-back pain.

In addition, the Mercy Conference guidelines, plus relevant literature, formed the basis of the clinical practice guidelines on low-back pain released in December 1994 by the Agency for Healthcare Policy and Research (AHCPR).[45] These guidelines rank spinal manipulation/ adjustment in the *top tier* of clinical options available for treatment of low-back pain.

EARLY CHIROPRACTIC INTERVENTION

The AHCPR guidelines specifically state that "manipulation can be helpful for patients with low-back problems without radiculopathy when used within the first month of symptoms." These conclusions were arrived at after extensive peer review of the literature, on-site clinical evaluations (pilot reviews), and the hearing of testimony by a 23-member multidisciplinary panel of experts, including consumer representatives. Both strengths and weaknesses in the scientific base were identified, so that it was possible to rank each type of clinical intervention on the effectiveness of its outcome (positive or negative) and the strength of its foundation as published in peer-reviewed literature.

Perhaps the most distinguishing characteristic of this study is that, among 23 options for the therapeutic intervention for relieving back pain, spinal manipulation and the use of nonsteroidal antiinflammatory agents remain sole strategies expected to have the most beneficial effect. All the remaining options (the use of acetaminophen, muscle relaxants, opioid analgesics, antidepressants, colchicine, oral steroids, shoe insoles, physical agents [including hot and cold packs], or lumbar corsets and back belts; trigger point, facet point, ligamentous or epidural injections; bio-feedback; traction; transcutaneous electrical stimulation; acupuncture; activity modification; bed rest; or mild exercise) either have fewer documented effects or are contraindicated.[45] Similar guidelines developed within Great Britain have come to essentially the same conclusions.[46]

Clearly these findings indicate that *early chiropractic intervention is the most effective and drugless intervention for most cases of low-back pain without sciatica.* Scientific research is the driving force that has enabled all these treatment options to be evaluated and ranked. Since only *15 percent of all medical procedures have been documented by research,*[47] *and only 1 percent have been shown to have any scientific value;*[48] the research that has led to the high ranking of chiropractic intervention takes on even greater significance. Chiropractic has received little research funding, but has used its resources to produce a premier status in scientific research circles, such as AHCPR.[49]

The strong educational and research bases of chiropractic, in addition to painstaking efforts to adopt standards and achieve consensus, have led to its increasing inclusion in reimbursement systems in public and private payer systems. In both the United States and Canada,

chiropractic has been included in Medicare, the majority of private insurance programs, workers' compensation, and personal injury reimbursement systems. Increasing numbers of health maintenance organizations (HMOs), preferred provider organizations (PPOs) and other managed healthcare systems are routinely including chiropractic services, as well.

CHRONIC PAIN CONSIDERATIONS

The belief that low-back pain is benign and will usually disappear after six weeks with no intervention has been significantly refuted by the recent literature. One study in the British Medical Journal demonstrated that, in a cohort of 170 patients, ***60 percent*** *still complained of pain and disability after one year.* Indeed, the author of this study was forced to conclude that low-back pain "should be viewed as a chronic problem with an untidy pattern of grumbling symptoms and periods of relative freedom from pain and disability interspersed with acute episodes."[50] A second study published within the past year was largely in agreement.[51] From these studies, it is reasonable to conclude that all cases of low-back pain have the potential to become chronic if left untreated. Therefore, such cases require immediate and appropriate intervention.

TREATMENT OF CONDITIONS OTHER THAN LOW-BACK PAIN

The process of validation of spinal manipulation/adjustment for the management of low-back pain has been more recently repeated for the cervical region and the treatment of neck pain and headache. In the past decade, clinical trials, prospective series and case studies have provided a strong evidence base for the management of these conditions by spinal manipulation/ adjustment.[52-66] The types of headache that have been documented in this research include tension-type, migraine and cervicogenic.

Other conditions in which the literature has suggested that there may be responsiveness to chiropractic intervention include the following:

1. Upper extremity disorders: carpal tunnel syndrome[67-70]

2. Obstetric/gynecologic disorders:
   a. Dysmenorrhea[71-73]
   b. Premenstrual syndrome[74-76]

3. Conditions of infants, children and adolescents:
   a. Scoliosis[77,78]
   b. Otitis media[79-81]
   c. Colic[82,83]
   d. Enuresis[84]

4. Pulmonary and circulatory disorders:
   a. Asthma[85-88]

5. GI dysfunctions[89-91]

6. Primary contact or care services[92,93]

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APPENDIX B

DECEMBER 1, 1999 LETTER TO ADMIRAL CARRATO

APPENDIX C

FEBRUARY 23, 2000 LETTER TO ADMIRAL CARRATO

Chiropractic Facts & Figures

Chiropractic offers a conservative, non-invasive, and preventative approach to health care. As evidence supporting the effectiveness of chiropractic continues to emerge, consumers are turning in record numbers to chiropractic care — a non-surgical, drug-free treatment option.

Just a few interesting facts on this increasingly popular form of health care:

- Chiropractic is the largest, most regulated, and best recognized of the complementary and alternative medicine (CAM) professions. *(Meeker, Haldeman; 2002; Annals of Internal Medicine)*

- There are more than 60,000 active chiropractic licenses in the United States. All 50 states, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands officially recognize chiropractic as a health care profession.

- According to a study published in the January 2006 issue of the medical journal *Alternative Therapies in Health and Medicine*, approximately 7.4 percent of the population visited a doctor of chiropractic in 2002. In 2002, U.S. adults relied more on the conservative care offered by doctors of chiropractic, than of yoga, massage, acupuncture or other diet-based therapies.

- Doctors of Chiropractic undergo at least four years of professional study at one of 16 chiropractic colleges accredited by the Council on Chiropractic Education (CCE), an agency recognized by the U.S. Secretary of Education. In addition, Doctors of Chiropractic must pass national board examinations and become state-licensed prior to practicing.

- In national surveys, patients favor chiropractic over medical care for back or neck pain. Patients routinely rate Doctors of Chiropractic highly in skill, manner, and explanation of treatment.

- Chiropractic is the third largest doctoral-level health care profession after medicine and dentistry.

- Back pain is the second leading cause of all physician visits in the U.S. In fact, half of all working Americans admit to having back pain each year. According to a study conducted by the American Chiropractic Association in 2001, 43% of patients seen by a doctor of chiropractic were treated for low-back pain.

- Chiropractic treatment is a covered benefit in many traditional insurance policies. In fact, according to some reports, as many as 87 percent of all insured American workers have coverage for chiropractic services in their health care plans.

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Frequently Asked Questions About Chiropractic

The American Chiropractic Association (ACA) receives many questions about chiropractic. Below are answers to the most commonly asked questions.

What conditions do chiropractors treat?

Chiropractic is a health care profession that focuses on disorders of the musculoskeletal system and the nervous system, and the effects of these disorders on general health. Chiropractic care is used most often to treat neuromusculoskeletal complaints, including but not limited to back pain, neck pain, pain in the joints of the arms or legs, and headaches.

How do I select a doctor of chiropractic?

You can locate a doctor of chiropractic (DC) by browsing the ACA Find a Doctor page (http://www.acatoday.com/search/memsearch.cfm), searching the Yellow Pages, speaking with friends, or contacting your local chamber of commerce. Because stringent educational and professional requirements are required for state licensure, the public is assured of academic competence and clinical experience – even with recent graduates.

Does chiropractic treatment require a referral from an MD?

No, a patient does not need referral by an MD before visiting a doctor of chiropractic. Chiropractors are first contact physicians, and are so defined in federal and state regulations. Following a consultation and examination, the doctor of chiropractic will arrive at a diagnosis under chiropractic care, or refer the patient to the appropriate health care provider.

Is chiropractic treatment safe?

Yes, chiropractic treatment is safe and effective. While any form of health treatment contains a degree of inherent risk, there is little danger in chiropractic care when administered by a licensed practioner. To assure competency, all states require that DCs be board-qualified, licensed, and regulated according to stringent criteria. Statistics show that patient risk is substantially lower for chiropractic because the use of prescription drugs and surgery are not used.

Is chiropractic treatment appropriate for children?

Yes, children can benefit from chiropractic care. Children are very physically active and experience many types of falls and blows from activities of daily living as well as from participating in sports. Injuries such as these may cause many symptoms including back and neck pain, stiffness, soreness or discomfort. Chiropractic care is always adapted to the individual patient. It is a highly skilled treatment, and in the case of children, very gentle.

Are chiropractors allowed to practice in hospitals or use medical outpatient facilities?

Chiropractors are being recognized to admit and treat patients in hospitals and to use outpatient clinical facilities (such as labs, x-rays, etc.) for their non-hospitalized patients. Hospital privileges were first granted in 1983.

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Do insurance plans cover chiropractic?

The majority of all insured American workers have coverage for chiropractic services in their health care plans. For example, the federal government's Office of Personnel Management offers chiropractic coverage for federal employees in both the Mail Handlers and BCBS benefit plans. In addition, there is a chiropractic benefit in Federal Workers' Compensation, and chiropractic care is available to members of the armed forces at more than 40 military bases, and is available at nearly 30 veterans' medical facilities.

What type of education and training do chiropractors have?

Chiropractors are educated as primary contact health care practitioners, with an emphasis on musculoskeletal diagnosis and treatment. Educational requirements for doctors of chiropractic are among the most stringent of any of the health care professions. The typical applicant at a chiropractic college has already acquired nearly four years of pre-medical undergraduate college education, including courses in biology, inorganic and organic chemistry, physics, psychology and related lab work. Once accepted into an accredited chiropractic college, the requirements become even more demanding — four to five academic years of professional study are the standard. Because of the hands-on nature of chiropractic, and the intricate adjusting techniques, a significant portion of time is spent in clinical training.

In total, the chiropractic curriculum includes a minimum of 4,200 hours of classroom, laboratory and clinical experience. The course of study is approved by an accrediting agency which is fully recognized by the U.S. Department of Education.

How is a chiropractic adjustment performed?

Chiropractic adjustment or manipulation is a manual procedure that utilizes the highly refined skills developed during the intensive years of chiropractic education. The chiropractor typically uses his/her hands to manipulate the joints of the body, particularly the spine, in order to reduce pain, and restore or enhance joint function. Chiropractic manipulation is a highly controlled procedure that rarely causes discomfort. The chiropractor adapts the procedure to meet the specific needs of each patient. Patients often note positive changes in their symptoms immediately following treatment.

Is chiropractic treatment ongoing?

The hands-on nature of the chiropractic treatment is essentially what requires patients to visit the chiropractor a number of times. To be treated by a chiropractor, a patient needs to be in his or her office. In contrast, a course of treatment from medical doctors often involves a pre-established plan that is conducted at home (i.e. taking a course of antibiotics once a day for a couple of weeks). A chiropractor may provide acute, chronic, and/or preventative care thus making a certain number of visits sometimes necessary. Your doctor of chiropractic should tell you the extent of treatment recommended and how long you can expect it to last.

Why is there a popping sound when a joint is adjusted?

Adjustment of a joint may result in release of a gas bubble between the joints that makes a popping sound – it's exactly the same as when you "crack" your knuckles. The noise is caused by the change of pressure within the joint that results in gas bubbles being released. There is no pain involved.

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Muse & Associates

Utilization, Cost, and Effects of Chiropractic Care on Medicare Program Costs

July 2001

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Executive Summary

This study examines the utilization, cost, and effects of Chiropractic services on Medicare program costs. In the course of this investigation, service utilization and program payments for Medicare beneficiaries who were treated by Doctors of Chiropractic are compared with similar data for beneficiaries treated by other provider types. The results strongly suggest that Chiropractic care significantly reduces per beneficiary costs to the Medicare program. The results also suggest that Chiropractic services could play a role in reducing costs of Medicare reform and/or a new prescription drug benefit. Presented below are detailed findings from our investigation.

What data and methods were used to investigate utilization, cost, and the effects of Chiropractic services on Medicare program costs?

To investigate utilization, cost and the effects of Chiropractic services on Medicare program costs, data were compiled from the Centers for Medicare and Medicaid Services' (CMS) 1999 5 Percent Standard Analytical Files. A data extract was created that identified all Medicare beneficiaries with primary diagnoses of selected musculoskeletal, dislocations, and sprains and strains of joints and adjacent muscles conditions during 1999. The beneficiaries were divided into two groups: (1) those who were treated by Doctors of Chiropractic and (2) those who were not. Service utilization and payment data for the two groups of beneficiaries were analyzed and compared.

How many beneficiaries had a Medicare claim with a primary diagnosis of any of the selected medical conditions during 1999?

During 1999, approximately 5.8 million beneficiaries had a Medicare claim with a principal diagnosis of at least one of the selected medical conditions. Of these individuals, about 1.5 million (26.8 percent) received Chiropractic care and 4.3 million (73.2 percent) were treated by other provider types.

Do global patterns of utilization and costs for all Medicare services differ between beneficiaries who did/did not receive Chiropractic care?

Yes, there was a consistent pattern of differences in service utilization and Medicare payments for beneficiaries who saw Doctors of Chiropractic versus those who did not.

- Beneficiaries who received Chiropractic care averaged fewer Medicare claims per capita than those who did not (33.4 claims versus 38.5 claims).
- Beneficiaries who received Chiropractic care had lower average Medicare payments for all Medicare services than those who did not ($4,426 versus $8,103).
- Beneficiaries who received Chiropractic care had lower average Medicare payments per claim than those who did not ($133 versus $210).

- Beneficiaries who received Chiropractic care had lower average costs for each type of claim during 1999 than those who did not.

Do patterns of utilization and costs for just the selected musculoskeletal and related medical conditions differ between beneficiaries who did/did not receive Chiropractic services?

Yes, the 26.8 percent of Medicare beneficiaries with the selected medical conditions who received Chiropractic care generated nearly twice as many claims per capita for these conditions but only 19 percent of the total Medicare payments for their treatment.

- Beneficiaries who received Chiropractic care averaged more claims per capita than those who did not (8.0 versus 4.0).
- Beneficiaries who received Chiropractic care had lower average Medicare payments per capita for the treatment of these conditions than those who did not ($380 versus $594).
- Beneficiaries who received Chiropractic care had lower average Medicare payments per claim than those who did not ($48 versus $149).

Do beneficiaries who did/did not receive Chiropractic care have different patterns in their subsequent utilization of Medicare services?

Yes, there are distinct differences between the two groups of beneficiaries in their subsequent use of Medicare services.

- During 1999, the majority of beneficiaries in both groups had subsequent encounters with the Medicare program, following their initial encounter for a primary diagnosis of any of the selected musculoskeletal and related conditions. However, a lower proportion of beneficiaries who received Chiropractic care had a second encounter (69 percent versus 80 percent) or a third encounter (66 percent versus 73 percent) compared those who did not receive Chiropractic services.
- Overall, a much lower proportion of both groups had a second or third encounter with the Medicare system for the treatment of the selected medical conditions. However, beneficiaries receiving Chiropractic care were less likely to have a second encounter (14 percent versus 34 percent) or a third encounter (11 percent versus 20 percent) than those who did not receive Chiropractic services.

Do gender differences explain the variations in service utilization and payments for these two groups of Medicare beneficiaries?

While gender differences on the order of about 5 percentage points exist between the two groups of beneficiaries, gender, by itself, does not appear to provide an explanation for the service utilization and payment variations.

Do differences in the age distributions of the two groups of beneficiaries explain the variations in service utilization and payments?

There are differences in the age distributions between the two groups of beneficiaries. A smaller proportion of beneficiaries under 65 years of age and over 80 years of age were likely to receive Chiropractic services. However, age, in this instance, appears to be a surrogate for medical acuity.

If one controls for acuity by deleting beneficiaries with institutionalized (i.e., hospital inpatient, SNF, and/or hospice) claims during 1999, do differences in utilization and costs between the two groups of beneficiaries still exist?

After removing beneficiaries with institutional claims during 1999, substantial differences still exist between the two groups of beneficiaries. Beneficiaries who received Chiropractic care still had lower overall payments per capita and per claim for all Medicare services and for their lower back pain care than those who did not.

What roles could Doctors of Chiropractic play in Medicare reform and/or a new prescription drug benefit for the elderly?

The findings of our current law analysis strongly suggest that decreased access to Chiropractic services would increase program costs. Attention should, therefore, be paid to access to Chiropractic services during the reform debate. Similarly, our analysis found that, overall, those beneficiaries who used Chiropractic services, have lower Medical doctor costs. Hence, some savings would probably accrue to the Medicare program if access to Chiropractic services were increased in concert with a Medicare prescription drug benefit.

In conclusion, these results strongly suggest that Chiropractic care significantly reduces per beneficiary costs to the Medicare program currently and could potentially save even more in the future.

Utilization, Cost, and Effects of Chiropractic Care on Medicare Program Costs

Introduction

The purpose of this study is to examine current cost savings associated with the provision of Chiropractic services in the Medicare program and to speculate on future potential savings. A primary obstacle to comprehensive coverage of Chiropractic services in the Medicare program has been the persistent perception by policy makers that such coverage would increase Medicare expenditures. For example, several years ago, one since departed CBO analyst placed an enormous price tag on a modest expansion of Chiropractic coverage. The supporting research that led up to these estimates was heavy on assumptions and light on facts. A formal investigation of the use and costs of Chiropractic services in the Medicare population is, therefore, warranted.

To analyze the cost savings associated with the provision of Chiropractic care in the Medicare program, we examined service utilization and program payments for Medicare beneficiaries with selected medical conditions who were treated by Doctors of Chiropractic and compared them with similar data for beneficiaries who was treated by other provider types. The remainder of this paper is divided into 4 sections**.** We begin by describing the data sources and methodology used to conduct our analyses. Next, we compare the service utilization patterns and costs of beneficiaries receiving Chiropractic care with those receiving care from other providers. For each group we investigate differences in their total use and costs of health care services and in their use and costs of service for the selected medical conditions. After that, we examine the demographic characteristics (i.e., gender and age) of each group of beneficiaries and attempt to explain the differences between Medicare beneficiaries who received Chiropractic care and those who did not. The final section speculates on potential savings that could accrue under Medicare reform or the addition of a prescription drug benefit to the program.

Background

This study builds on extensive research conducted by the Department of Defense (DOD). DOD conducted a multi-year and multi-site demonstration of Chiropractic services.[1]

[1] *Report on the Department of Defense Chiropractic Demonstration Program*, Prepared by the Chiropractic members of the Oversight Advisory Committee in collaboration with Muse & Associates, March 3, 2000. Also, *Chiropractic Health Care Demonstration Program: Final Report*, Birth and Davis, Inc., February 2000.

Both a DOD contractor and Muse & Associates evaluated the results of the demonstration and found that, relative to non-users, users of Chiropractic services had:

- Better health outcomes;
- Higher satisfaction; and
- Lower costs.

A section of that report looked at the elderly. This study builds on that research and focuses primarily on the elderly.

Data Sources and Methodology

The data used in this study were compiled from the Centers for Medicare and Medicaid Services' (CMS) 1999 Standard Analytical Public Use Files (SAF). These files, which contain final action claims data with all adjustments resolved, capture 98 percent of all claims for all Medicare beneficiaries in a given year. The 5 Percent SAF, the data source used in this study, is created by selecting all claims records for beneficiaries with values 05, 20, 45, 70, or 95 in positions 8 and 9 of the Health Insurance Claim number.

The 5 Percent SAF consists of 7 separate files. These include inpatient, skilled nursing facility (SNF), outpatient, hospice, durable medical equipment (DME), home health agency, and Part B physician/suppliers. Results from all analyses of these files can be extrapolated to the entire Medicare population.

To conduct our analyses, we completed the following tasks:

1. From the 1999 SAF, we created a data extract that:
    - Identified all Medicare beneficiaries with primary diagnosis of selected musculoskeletal and related medical conditions;[2]
    - Pulled all of the claims for each of the beneficiaries identified.
2. From the initial extract, we created a research file that:
    - Divided the beneficiaries into two groups: (1) those who were treated by Doctors of Chiropractic and (2) those who were not. Beneficiaries who were treated by both Doctors of Chiropractic and other providers were placed in the Chiropractic care group.;

[2] The selected categories included ICD-9 diagnostic codes 720.xx, 721.xx, 722.xx, 723.xx, 724.xx, 739.xx, 839.xx, 846.xx, and 847.xx. While these ICD-9 codes are the ones typically seen in Chiropractic practice, there is great variability in the use of these codes by Doctors of Chiropractic and other providers.

- Created sub-files for each group of beneficiaries for the selected medical diagnoses only;

- Provided service utilization and payment data for the treatment of beneficiaries with these selected primary diagnoses in the Medicare population.

Scope of Chiropractic Services

There is a misconception that Doctors of Chiropractic only treat low back pain. Although Doctors of Chiropractic have experience in treating back pain, they are trained and educated to treat a range of neuromusculoskeletal conditions and related ailments that affect the entire body. According to Chapman,[3] various studies, which include national surveys in the U.S., Canada, Australia, and Europe, indicate that 95 percent of Chiropractic patients have neuromusculoskeletal pain/neuromusculoskeletal disorders.

Chapman states that in treating neuromusculoskeletal pains and disorder, Doctors of Chiropractic may encounter non-musculoskeletal complaints. Whatever the patient's condition, Doctors of Chiropractic fundamentally see themselves as diagnosing and treating the underlying joint and soft tissue dysfunction. This will have reflex effects in the nervous system that may influence various conditions and general health, not just the patient's primary neuromusculoskeletal complaint.

Appendix A provides a list of the diagnoses codes commonly treated by Doctors of Chiropractic. The list, while not exhaustive or all-inclusive, includes diagnoses codes for diseases of the nervous system and sense organs, including migraines, diseases of the musculoskeletal system and corrective tissues, congenital abnormalities, and injuries, including sprains and strains.

Analysis

Baseline Summary

The analysis begins with an examination of the baseline summary of all claims for all services for Medicare beneficiaries with the selected primary diagnoses. Baseline summary data are presented in Table 1.

In 1999, there were over 5.8 million out of a total of approximately 39 million Medicare beneficiaries, nearly 15 percent of all beneficiaries, with at least one medical claim with a principal diagnosis included in the group of selected medical conditions. Collectively, these individuals generated 216 million medical claims and Medicare program payments in excess of $41 billion. On a per capita basis, program payments per beneficiary equaled $7,117. Payments per claim averaged $191.49.

[3]Chapman-Smith, David. *The Chiropractic Profession*, West Des Moines, IA: NCMIC Group, Inc., 2000.

As shown in Table 1, nearly every beneficiary generated a Part B professional claim and over 80 percent used outpatient services. Additionally, approximately 30 percent (29.2 percent) of the beneficiaries had DME claims and 28.4 percent had an inpatient hospitalization. Significantly lower proportions of these beneficiaries used home health services, had a nursing home stay, or needed hospice care.

Table 1
1999 Baseline Summary of All Claims for Patients with a Primary Diagnosis of Selected Musculoskeletal and Related Medical Conditions

File	Medicare Beneficiaries	Claims	Medicare Payments	Average Payment Per Beneficiary	Average Payment Per Claim
All Files	5,811,440	215,998,220	$41,362,447,475	$7,117.42	$191.49
DME	1,697,640	9,433,780	$1,135,903,530	$669.11	$120.41
Home Health	684,960	2,338,260	$1,849,526,230	$2,700.20	$790.98
Hospice	58,400	141,720	$262,461,482	$4,494.20	$1,851.97
Inpatient	1,651,980	3,115,040	$19,899,049,229	$12,045.58	$6,388.06
Outpatient	4,710,980	28,758,020	$4,205,937,375	$892.79	$146.25
Professional	5,790,340	171,467,460	$11,698,392,594	$2,020.33	$68.23
SNF	350,480	743,940	$2,311,177,035	$6,594.32	$3,106.67

Inpatient services, $19.9 billion, accounted for nearly half (48.1%) of total 1999 Medicare program payments for these beneficiaries, with professional services ($11.7 billion) and SNF payments ($2.3 billion) accounting for an additional 10.2 percent and 5.6 percent, respectively. On average, Medicare program payments per beneficiary were highest for inpatient hospital services ($12,046), SNF care ($6,594) and hospice services ($4,494) and lowest for outpatient services ($893) and DME ($669).

Comparison of Beneficiaries Receiving Chiropractic Services with Those Treated by Other Provider Types

The next step in the analysis was to compare the patterns of service utilization and payments of beneficiaries who received Chiropractic services with beneficiaries treated by other providers. To complete this analysis, the 5.8 million Medicare beneficiaries identified in the extract were divided into two groups based on the occurrence of provider specialty code "35 – Chiropractic" on their Part B Physician/Supplier and DME claims. The results are summarized in Table 2 and Table 3.

Table 2 compares the use of all medical services and their associated Medicare payments for these two groups of beneficiaries. In Table 3, the comparison is restricted to just

claims for the treatment of the selected medical conditions that formed the basis of the initial data extract.

All Claims

As shown in Tables 2 and 3, approximately 1.6 million (26.8 percent) of the 5.8 million Medicare beneficiaries with primary diagnoses of selected musculoskeletal and related medical conditions received treatment from Doctors of Chiropractic. In comparing these beneficiaries with those who did not receive Chiropractic care, several interesting results stand out.

Table 2
Summary of All Claims for Beneficiaries with a Primary Diagnosis of
Selected Musculoskeletal and Related Medical Conditions
1999

Beneficiary Type	File	Medicare Beneficiaries	Claims	Medicare Payments	Average Payment Per Beneficiary	Average Payment Per Claim
Beneficiary not seen by a Doctor of Chiropractic	All Files	4,253,720	164,013,400	$34,467,924,349	$8,103.01	$210.15
	DME	1,365,200	7,911,360	$969,683,906	$710.29	$122.57
	Home Health	592,940	2,096,620	$1,677,461,033	$2,829.06	$800.08
	Hospice	51,640	125,980	$233,721,204	$4,525.97	$1,855.22
	Inpatient	1,356,480	2,635,500	$16,832,524,858	$12,408.97	$6,386.84
	Outpatient	3,554,480	22,771,980	$3,435,468,009	$966.52	$150.86
	Professional	4,232,620	127,800,140	$9,213,109,498	$2,176.69	$72.09
	SNF	309,620	671,820	$2,105,955,841	$6,801.74	$3,134.70
Beneficiary seen by a Doctor of Chiropractic	All Files	1,557,720	51,984,820	$6,894,523,126	$4,426.03	$132.63
	DME	332,440	1,522,420	$166,219,623	$500.00	$109.18
	Home Health	92,020	241,640	$172,065,197	$1,869.87	$712.07
	Hospice	6,760	15,740	$28,740,278	$4,251.52	$1,825.94
	Inpatient	295,500	479,540	$3,066,524,371	$10,377.41	$6,394.72
	Outpatient	1,156,500	5,986,040	$770,469,365	$666.21	$128.71
	Professional	1,557,720	43,667,320	$2,485,283,097	$1,595.46	$56.91
	SNF	40,860	72,120	$205,221,194	$5,022.55	$2,845.55

Examination of the data for all claims for all services (and their associated Medicare payments) utilized during 1999 (Table 2) reveals some very clear differences between the two groups of beneficiaries. Beneficiaries treated by Doctors of Chiropractic comprise 26.8 percent of the beneficiaries with any of the selected ICD-9 diagnosis codes and 24.1 percent of their claims. However, they generated only 16.7 percent of total Medicare payments, a significantly lower proportion than their numbers would suggest. Recipients of Chiropractic care averaged 33.4 claims per beneficiary in 1999, 5 fewer claims per person than beneficiaries not receiving Chiropractic care. More importantly, their per capita payments for all Medicare services utilized during 1999 were nearly 50 percent lower than those for recipients who did not receive Chiropractic care ($4,426 versus

$8,103). Similarly, the average payment per claim for all Medicare services used during 1999 is almost 40 percent lower for beneficiaries who received Chiropractic services ($132.63 versus $210.15). Regardless of the type of claim, average payment per beneficiary was substantially lower for beneficiaries treated by a Doctor of Chiropractic. With only two exceptions (e.g., hospice and inpatient hospital), similar findings are noted for average payment per claim. However, even in the case of these two exceptions, the average costs per service are nearly identical for the two groups of beneficiaries. Therefore, when all claims for all services are examined, it would appear that Medicare beneficiaries who were treated by Doctors of Chiropractic during 1999 had fewer Medicare claims per capita and lower average Medicare payments for all Medicare services than those who did not.

Selected Musculoskeletal and Related Claims Only

When the comparison of utilization and Medicare payments is restricted to just claims for the selected musculoskeletal and related claims used to define the initial extract, the overall results, while similar, also include some key findings (Table 3). For example, while constituting 26.8 percent of Medicare beneficiaries, beneficiaries who received Chiropractic care during 1999 generated 42.3 percent of such claims. They averaged nearly 8 claims per capita compared to only 4 claims per capita for beneficiaries who did not receive Chiropractic care.

Table 3
Summary of All Musculoskeletal and Related Claims for Patients with a Primary Diagnosis of Selected Musculoskeletal and Related Medical Conditions
1999

Beneficiary Type	File	Medicare Beneficiaries	Claims	Medicare Payments	Average Payment Per Beneficiary	Average Payment Per Claim
Beneficiary not seen by a Doctor of Chiropractic	All Files	4,253,720	16,940,020	$2,524,698,640	$593.53	$149.04
	DME	208,220	489,320	$53,808,762	$258.42	$109.97
	Home Health	55,060	114,160	$84,816,650	$1,540.44	$742.96
	Hospice	80	140	$274,067	$3,425.84	$1,957.62
	Inpatient	142,060	157,500	$858,751,277	$6,044.99	$5,452.39
	Outpatient	1,578,360	2,985,540	$390,056,484	$247.13	$130.65
	Professional	3,916,100	13,163,860	$1,044,195,022	$266.64	$79.32
	SNF	19,600	29,500	$92,796,379	$4,734.51	$3,145.64
Beneficiary seen by a Doctor of Chiropractic	All Files	1,557,720	12,439,080	$592,095,669	$380.10	$47.60
	DME	21,940	40,340	$3,841,226	$175.08	$95.22
	Home Health	4,560	8,320	$5,472,240	$1,200.05	$657.72
	Inpatient	18,220	20,320	$104,815,244	$5,752.76	$5,158.23
	Outpatient	207,720	408,300	$54,193,176	$260.90	$132.73
	Professional	1,556,640	11,958,900	$414,821,202	$266.48	$34.69
	SNF	1,820	2,900	$8,952,580	$4,919.00	$3,087.10

However, despite the fact that they comprise slightly more than one-fourth of all Medicare beneficiaries in the extract and had twice as many claims per capita (over 40 percent of all services associated with the selected diagnoses), Medicare payments for the treatment of these selected medical conditions for beneficiaries receiving Chiropractic care constituted only 19 percent of all Medicare payments for the treatment of these conditions. Furthermore, beneficiaries treated by Doctors of Chiropractic had average payments per capita that were nearly 40 percent lower than those for beneficiaries who received care from other providers ($380.10 versus $593.53). Also, average payment per claim for the treatment of these medical conditions was nearly two-thirds lower for beneficiaries receiving Chiropractic care compared to beneficiaries not seen by Doctors of Chiropractic ($47.60 versus $149.04). As with the summary of all claims (see above), with few exceptions, regardless of the type of claim, average payment per beneficiary and average payment per claim were lower for beneficiaries who received Chiropractic care. Therefore, Medicare beneficiaries treated by Doctors of Chiropractic averaged twice as many claims per capita but generated significantly lower Medicare payments than beneficiaries receiving services from other providers.

Subsequent Use of Medicare Services

Using a methodology developed for a previous study,[4] further analysis was conducted to examine subsequent service utilization patterns for both groups of beneficiaries. The analysis consists of chronologically ordering the claims data for each beneficiary and summarizing the information by "encounter." An encounter is defined as a chronologically contiguous episode of care at a particular provider type from a single SAF file. Because date of service is not listed on the claims, the chronological order was determined by using incurred quarter and claim receipt date. Conflicts in the ordering of records from different files are resolved using a predetermined sequence of files (Inpatient, SNF, HHA, outpatient, hospice, Part B physician/supplier, and DME). Only the first contact with a primary diagnosis of one of the selected medical conditions and the subsequent two encounters for Medicare services are included in this analysis. Results of the analysis of subsequent use of Medicare services are presented in Tables 4 and 5.

All Claims

Starting with the first encounter during 1999 for any of the selected ICD-9 diagnosis codes used to define the initial extract, we began our analysis of beneficiaries' subsequent contacts with the Medicare program by examining the next two encounters for all services (Tables 4). Presented in Table 4 are a count of beneficiaries, total payments, and average payment per beneficiary for each of the first three encounters, including the initial encounter containing a claim with any of the selected primary diagnosis codes.

[4] Muse & Associates, *An Analysis of Rehabilitation Services "Flow" Patterns and Payments by Provider Setting for Medicare Beneficiaries*, Washington, DC: November 1997.

Table 4
Subsequent Encounters with the Medicare Program for
Beneficiaries with a Primary Diagnosis of Selected
Musculoskeletal and Related Medical Conditions
All Claims: 1999
(by treatment status and contact)

Beneficiary Type	Encounter	Medicare Beneficiaries	Percent of Medicare Beneficiaries	Medicare Payments	Medicare Payment Per Beneficiary
Beneficiary not seen by a Doctor of Chiropractic	First	4,253,720	100.0%	$1,463,955,180	$344.16
	Second	3,383,140	79.5%	$2,442,063,163	$721.83
	Third	3,117,840	73.3%	$1,497,207,909	$480.21
Beneficiary seen by a Doctor of Chiropractic	First	1,557,720	100.0%	$589,136,161	$378.20
	Second	1,079,260	69.3%	$547,406,907	$507.21
	Third	1,033,100	66.3%	$408,319,296	$395.24

In general, the majority of Medicare beneficiaries in both groups had multiple encounters with the Medicare program in 1999. Of the beneficiaries not treated by Doctors of Chiropractic, approximately 80 percent had a second encounter with the Medicare program during 1999, following their initial claim for one of the selected primary diagnoses. Nearly three-quarters (73.3 percent) of these beneficiaries also had a third encounter later that year. By comparison, 69 percent of beneficiaries who received Chiropractic care had a second encounter with the Medicare program and 66 percent had a third encounter during 1999.

Interestingly, beneficiaries not receiving Chiropractic services had average payments per beneficiary for all services for their first encounter with the Medicare program during 1999 that were nearly 10 percent lower than average payments for beneficiaries who received Chiropractic services ($344.16 versus $378.20). However, for the second and third encounters, the situation is reversed. Beneficiaries receiving Chiropractic care had significantly lower average Medicare payments per encounter.

Selected Musculoskeletal and Related Claims Only

Considering only claims for the selected musculoskeletal and related diagnoses, the analysis of the first three encounters with the Medicare program during 1999 was repeated. The results of this analysis are presented in Table 5.

The data presented in Table 5 indicate several interesting findings. Not surprising, a much smaller proportion of beneficiaries with any of the selected musculoskeletal and related medical conditions during 1999 had a second or third encounter with the Medicare program for these conditions than was the case with their overall use of Medicare services. The great majority of treatments for these medical conditions were received in the same provider setting. However, as was the case with their use of all services, a much lower proportion of beneficiaries treated by Doctors of Chiropractic had a second or third encounter with the Medicare program.

Table 5
Subsequent Contacts with the Medicare Program for
Beneficiaries with a Primary Diagnosis of Selected
Musculoskeletal and Related Medical Conditions: 1999
Musculoskeletal and Related Claims Only
(by treatment status and contact)

Beneficiary Type	Encounter	Medicare Beneficiaries	Percent of Medicare Beneficiaries	Medicare Payments	Medicare Payment Per Beneficiary
Beneficiary not seen by a Doctor of Chiropractic	First	4,253,700	100.0%	$806,570,036	$189.62
	Second	1,447,700	34.0%	$546,358,964	$377.40
	Third	831,200	19.5%	$289,624,275	$348.44
Beneficiary seen by a Doctor of Chiropractic	First	1,557,720	100.0%	$329,015,857	$211.22
	Second	222,040	14.3%	$69,002,782	$310.77
	Third	169,880	10.9%	$48,738,672	$286.90

Medicare beneficiaries receiving Chiropractic care had average Medicare payments for their first encounter for these selected musculoskeletal and related medical conditions that were approximately 11 percent higher than the average payment for beneficiaries treated by other providers. This may be due, at least in part, to the fact that beneficiaries receiving Chiropractic care for the treatment of these medical conditions averaged twice as many claims per capita compared to beneficiaries who received treatment from other providers. Thus, when aggregated over the entire first encounter, the total cost for that encounter may be higher for beneficiaries receiving Chiropractic care, even though their average Medicare payment per claim was significantly lower. For those beneficiaries who had a second and/or third

encounter for these conditions during 1999, both the proportion of beneficiaries having second or third encounters and the average Medicare payments per encounter were significantly lower for beneficiaries treated by Doctors of Chiropractic.

Why are there Differences Between Beneficiaries Seen and Not Seen by Doctors of Chiropractic?

Our comparative analysis of the use of and payments for services by Medicare beneficiaries who were/were not treated by Doctors of Chiropractic for these selected primary diagnoses during 1999 indicates that there are differences between the two groups. In general, beneficiaries receiving Chiropractic care had lower average payments per capita and per claim for all Medicare services and for claims associated with the treatment of their musculoskeletal and related medical problems. With the exception of the first encounter involving a principal diagnosis of one of these selected diagnoses, they also had lower average payments per beneficiary for the subsequent two encounters with the Medicare system.

Given these findings, what factors explain the differences between these two groups of Medicare beneficiaries? Is it gender, age, and/or acuity? First we examine gender. Then we consider the age distributions of the two groups of beneficiaries and, finally, acuity.

Gender

As shown in Table 6, a slightly lower proportion of females received treatment from Doctors of Chiropractic than from other provider types (58.8. percent versus 63.7 percent). Conversely, a higher proportion of males received Chiropractic care than treatments from other providers (41.2 percent versus 36.3 percent).

Table 6
Number of Beneficiaries
by Gender and Treatment Status

Beneficiary Type	Female	Male	Total
Beneficiary not seen by a Doctor of Chiropractic	2,710,420	1,543,300	4,253,720
Percent	63.7%	36.3%	100.0%
Beneficiary seen by a Doctor of Chiropractic	916,180	641,540	1,557,720
Percent	58.8%	41.2%	100.0%
Total	3,626,600	2,184,840	5,811,440

While these differences, on the order of 5 percentage points, exist, they do not appear to be sufficiently large by themselves to account for the service utilization and payment differences between the two groups of beneficiaries. Gender, therefore, does not appear to have high explanatory power to differentiate between these groups.

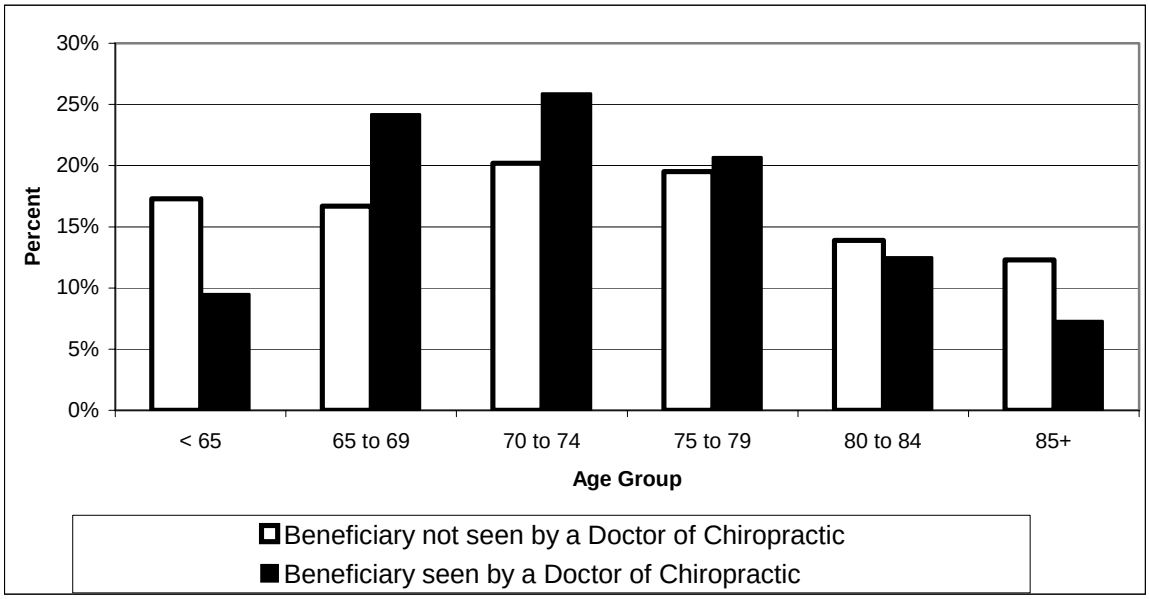
Age

Data on the age distribution of the two groups of beneficiaries are presented in Table 7 and Figure 1. Examination of the data suggests some potentially important differentiating factors. It is clear from a review of Table 7 and Figure 1that Medicare beneficiaries under age 65 (i.e., the "disabled" and "ESRD" populations) are much less likely to have received Chiropractic care. Likewise, among beneficiaries 80 years of age and older, a smaller proportion were treated by Doctors of Chiropractic. Conversely, a higher percentage of beneficiaries between 65 and 74 years of age received Chiropractic care. For beneficiaries 75-79 years of age, approximately the same proportion did and did not receive Chiropractic care. This suggests that medical doctors, not Doctors of Chiropractic, treat older and/or sicker Medicare beneficiaries. Therefore, acuity may be an important factor in explaining differences in the use of Chiropractic services among Medicare beneficiaries.

Table 7
Age Distribution of Beneficiaries with a Primary
Diagnosis of Selected Musculoskeletal and Related Medical Conditions
(by gender and treatment status)

Beneficiary Type	Age Group	Female	% Female	Male	% Male	Total	%
Beneficiary not seen by a Doctor of Chiropractic	64 and Younger	378,080	13.9%	359,840	23.3%	737,920	17.3%
	65 to 69	447,020	16.5%	264,980	17.2%	712,000	16.7%
	70 to 74	549,400	20.3%	310,840	20.1%	860,240	20.2%
	75 to 79	548,640	20.2%	281,380	18.2%	830,020	19.5%
	80 to 84	402,140	14.8%	187,920	12.2%	590,060	13.9%
	85 and Older	385,140	14.2%	138,340	9.0%	523,480	12.3%
	Total	2,710,420	100.0%	1,543,300	100.0%	4,253,720	100.0%
Beneficiary seen by a Doctor of Chiropractic	64 and Younger	77,400	8.4%	70,180	10.9%	147,580	9.5%
	65 to 69	216,880	23.7%	159,460	24.9%	376,340	24.2%
	70 to 74	233,480	25.5%	170,140	26.5%	403,620	25.9%
	75 to 79	193,280	21.1%	128,540	20.0%	321,820	20.7%
	80 to 84	120,920	13.2%	74,480	11.6%	195,400	12.5%
	85 and Older	74,220	8.1%	38,740	6.0%	112,960	7.3%
	Total	916,180	100.0%	641,540	100.0%	1,557,720	100.0%

Figure 1
Age Distribution of Beneficiaries with a Primary
Diagnosis of Selected Musculoskeletal and Related Medical Conditions



Removing Acuity

There is no simple or direct way to measure medical acuity from the data included in the 1999 5 Percent SAF. Accordingly, to assess whether acuity is important in differentiating beneficiaries who did/did not receive Chiropractic care during 1999 for the treatment of these selected medical diagnoses, we used an approach that deleted the institutionalized population which, by definition, has high medical acuity.

To test this hypothesis, we deleted beneficiaries with inpatient hospital, SNF, and/or hospice claims during 1999 and reran the service utilization and cost analyses. Controlling for acuity of beneficiaries' overall medical conditions results in a mostly ambulatory patient population, the type of population most likely to seek out and benefit from Chiropractic care. The findings from our reanalysis are presented in Tables 8 and 9.

All Claims

Presented in Table 8 are analytical results from the reanalysis of all claims for primarily ambulatory Medicare beneficiaries. As shown in Table 8, beneficiaries treated by

Doctors of Chiropractic had lower overall payments per claim and per beneficiary for all Medicare services used during 1999 than beneficiaries receiving treatment from other providers. Likewise, for every type of claim, Medicare payments per patient and per claim are substantially lower for beneficiaries who received Chiropractic care for their musculoskeletal land related medical conditions.

Table 8
Summary of All Claims for Beneficiaries with a Primary
Diagnosis of Selected Musculoskeletal and Related Medical Conditions
(Inpatient, Skilled Nursing Facility, and Hospice Beneficiaries Deleted)
1999

Beneficiary Type	File	Medicare Beneficiaries	Claims	Medicare Payments	Average Payment Per Beneficiary	Average Payment Per Claim
Beneficiary not seen by Doctor of Chiropractic	All Files	2,878,900	77,855,140	$5,815,128,170	$2,019.91	$74.69
	DME	673,080	3,155,200	$382,771,913	$568.69	$121.31
	Home Health	109,560	424,500	$308,916,874	$2,819.61	$727.72
	Outpatient	2,295,760	12,170,100	$1,543,707,105	$672.42	$126.84
	Professional	2,861,760	62,105,340	$3,579,732,279	$1,250.88	$57.64
Beneficiary seen by Doctor of Chiropractic	All Files	1,260,140	34,251,780	$1,937,014,882	$1,537.14	$56.55
	DME	208,960	825,780	$84,162,077	$402.77	$101.92
	Home Health	15,460	47,080	$32,680,646	$2,113.88	$694.15
	Outpatient	886,360	3,885,300	$440,352,524	$496.81	$113.34
	Professional	1,260,140	29,493,620	$1,379,819,635	$1,094.97	$46.78

Selected Musculoskeletal and Related Claims Only

The data were reanalyzed with claims for the selected musculoskeletal and related diagnoses only (Table 9). As shown in Table 9, on the next page, primarily ambulatory beneficiaries treated by Doctors of Chiropractic had lower overall Medicare payments per capita and per claim than beneficiaries treated by other provider types. However, Chiropractic patients did generate slightly higher average Medicare payments per beneficiary for Outpatient services and moderately higher average payments per beneficiary for Professional services. In this case of Professional services, the higher average payment per beneficiary is the result of a higher number of beneficiary visits. For Outpatient services, the average payments per claim are nearly identical for the two groups of beneficiaries.

Table 9
Summary of Musculoskeletal and Related Claims Only for Patients with a Primary Diagnosis of Selected Musculoskeletal and Related Medical Conditions:
(Inpatient, Skilled Nursing Facility, and Hospice Beneficiaries Deleted)
1999

Beneficiary Type	File	Medicare Beneficiaries	Claims	Medicare Payments	Average Payment Per Beneficiary	Average Payment Per Claim
Beneficiary not seen by Doctor of Chiropractic	All Files	2,878,900	10,291,700	$808,179,022	$280.72	$78.53
	DME	113,020	250,120	$25,698,273	$227.38	$102.74
	Home Health	13,140	29,840	$19,834,639	$1,509.49	$664.70
	Outpatient	1,050,020	1,917,180	$244,832,344	$233.17	$127.70
	Professional	2,646,320	8,094,560	$517,813,766	$195.67	$63.97
Beneficiary seen by Doctor of Chiropractic	All Files	1,260,140	9,911340	$337,431,780	$267.77	$34.05
	DME	13,000	22,700	$1,917,973	$147.54	$84.49
	Home Health	780	1,520	$937,461	$1,201.87	$616.75
	Outpatient	146,240	276,080	$35,705,762	$244.16	$129.33
	Professional	1,259,300	9,611,040	$298,870,584	$237.33	$31.10

In conclusion, these results strongly suggest that Chiropractic care reduces per beneficiary costs to the Medicare program under current law.

Potential Future Savings Under Medicare and/or the Addition of Prescription Drugs

Congress and the President are committed to Medicare reform and establishment of some form of a prescription drug benefit for the Medicare population.

Medicare Reform

A wide variety of approaches and proposals exist for Medicare reform. Some address the role of the private sector in the program. Others focus on incentives that could lead to some over utilization of services by the elderly. These proposals may result in either increased or decreased access to Chiropractic services. The findings of our current law analysis strongly suggest that decreased access to Chiropractic services would increase program costs. This is contrary to the purpose of the Medicare program, which is to provide cost-effective health care services to the broadest group of Medicare beneficiaries. Attention should, therefore, be paid to access to Chiropractic Services during the Medicare reform debate.

A Prescription Drug Benefit

Doctors, not beneficiaries, write prescription drug scripts. Extensive research shows that the more visits a person has to a medical doctor, the more prescriptions they are likely to receive. Our analysis found that, overall, those beneficiaries who used Chiropractic services, have lower medical doctor costs and, by extrapolation, lower prescription drug costs. Thus, enhanced access to Chiropractic services could drive down the number of prescriptions even further. Therefore, some savings would probably accrue to the Medicare program if access to Chiropractic services was increased.

(V:ACA/Medicare 2001/Report)

Appendix A

List of Diagnoses Commonly Treated By Doctors of Chiropractic

Appendix A

List of Diagnoses Commonly Treated By Doctors of Chiropractic

ICD-9-CM CODES

International Classification of Diseases, 9th Revision, Clinical Modification Codes (ICD-9–CM Codes) are designed to classify illnesses, injuries, and patient-health care provider encounters for services.

NOTE: This is not an all-inclusive list of ICD-9 codes, and is provided simply as a list of commonly used codes by DCs.

ICD-9-CM Codes

ICD CODES – NUMERIC CATEGORY LISTING

CODE	*DESCRIPTION*
320-389.1.1	**Diseases of the Nervous System and Sense Organs**
333.83	SPASMODIC TORTICOLLIS
346	MIGRAINE
346.0	CLASSIC MIGRAINE
346.1	COMMON MIGRAINE
346.2	VARIANTS OF MIGRAINE
346.8	OTHER FORMS OF MIGRAINE
346.9	MIGRAINE, UNSPECIFIED
350.1	TRIGEMINAL NEURALGIA
350.2	ATYPICAL FACE PAIN
351	FACIAL NERVE DISORDER
351.0	BELL'S PALSY
352	DISORDERS OF OTHER CRANIAL NERVES
352.3	DISORDERS OF PNEUMOGASTRIC (10TH) NERVE
352.9	UNSPECIFIED DISORDER OF CRANIAL NERVES
353	NERVE ROOT AND PLEXUS DISORDERS
353.0	BRACHIAL PLEXUS LESIONS
353.1	LUMBOSACRAL PLEXUS LESIONS
353.2	CERVICAL ROOT LESIONS, NOT ELSEWHERE CLASSIFIED
353.3	THORACIC ROOT LESIONS, NOT ELSEWHERE CLASSIFIED
353.4	LUMBOSACRAL ROOT LESIONS, NOT ELSEWHERE CLASSIFIED
353.8	OTHER NERVE ROOT AND PLEXUS DISORDERS
353.9	UNSPECIFIED NERVE ROOT AND PLEXUS DISORDER

354	MONONEURITIS UPPER LIMB
354.0	CARPAL TUNNEL SYNDROME
354.1	OTHER LESION OF MEDIAN NERVE
354.2	LESION OF ULNAR NERVE
354.3	LESION OF RADIAL NERVE
354.4	CAUSALGIA OF UPPER LIMB
354.5	MONONEURITIS MULTIPLEX
354.8	OTHER MONONEURITIS OF UPPER LIMB
354.9	MONONEURITIS OF UPPER LIMB, UNSPECIFIED
355	MONONEURITIS LEG
355.0	LESION OF SCIATIC NERVE
355.1	MERALGIA PARESTHETICA
355.4	LESION OF MEDIAL POPLITEAL NERVE
355.5	TARSAL TUNNEL SYNDROME
381.4	NONSUPPURATIVE OTITIS MEDIA, NOT SPECIFIED AS ACUTE OR CHRONIC
386	VERTIGINOUS SYNDROME
386.0	MENIERE'S DISEASE
386.3	LABYRINTHITIS, UNSPECIFIED
386.9	UNSPECIFIED VERTIGINOUS SYNDROMES AND LABYRINTHINE DISORDERS

390-459 Diseases of the Circulatory System

401.9	UNSPECIFIED ESSENTIAL HYPERTENSION

520-579 Diseases of the Digestive System

524.6	TEMPOROMANDIBULAR JOINT DISORDERS, UNSPECIFIED

630-677 Complications of Pregnancy, Childbirth, and Puerperium

648.7.1.1.1.1	BONE AND JOINT DISORDERS OF BACK, PELVIS, AND LOWER LIMBS OF MOTHER, COMPLICATING PREGNANCY, CHILDBIRTH, OR THE PUERPERIUM

710-739 Diseases of the Neuromusculoskeletal System and Connective Tissue

710.4	POLYMYOSITIS
714.3	CHRONIC OR UNSPECIFIED POLYARTICULAR JUVENILE RHEUMATOID ARTHRITIS
715	OSTEOARTHROSIS, GENERALIZED
715.0	OSTEOARTHROSIS AND ALLIED DISORDERS
715.00	OSTEOARTHROSIS, GENERALIZED, INVOLVING UNSPECIFIED SITE
715.04	OSTEOARTHROSIS, GENERALIZED, INVOLVING HAND
715.09	OSTEOARTHROSIS, GENERALIZED, INVOLVING MULTIPLE SITES
715.1	OSTEOARTHROSIS, LOCALIZED, PRIMARY

715.11	OSTEOARTHROSIS, LOCALIZED, PRIMARY, INVOLVING SHOULDER REGION
715.15	OSTEOARTHROSIS, LOCALIZED, PRIMARY, INVOLVING PELVIC REGION AND THIGH
715.18	OSTEOARTHROSIS, LOCALIZED, PRIMARY, INVOLVING OTHER SPECIFIED SITES
715.2	OSTEOARTHROSIS, LOCALIZED, SECONDARY
715.3	OSTEOARTHROSIS, LOCALIZED, NOT SPECIFIED WHETHER PRIMARY OR SECONDARY
715.30	OSTEOARTHROSIS, LOCALIZED, NOT SPECIFIED WHETHER PRIMARY OR SECONDARY, UNSPECIFIED
715.38	OSTEOARTHROSIS, LOCALIZED, NOT SPECIFIED WHETHER PRIMARY OR SECONDARY, INVOLVING OTHER SPECIFIED SITES
715.8	OSTEOARTHROSIS INVOLVING OR WITH MENTION OF MORE THAN ONE SITE, BUT NOT SPECIFIED AS GENERALIZED
715.80	OSTEOARTHROSIS INVOLVING OR WITH MENTION OF MORE THAN ONE SITE, BUT NOT SPECIFIED AS GENERALIZED, AND INVOLVING UNSPECIFIED SITE, UNSPECIFIED
715.89	OSTEOARTHROSIS INVOLVING OR WITH MENTION OF MULTIPLE SITES, BUT NOT SPECIFIED AS GENERALIZED
715.9	OSTEOARTHROSIS, UNSPECIFIED WHETHER GENERALIZED OR LOCALIZED, INVOLVING UNSPECIFIED SITE
715.90	OSTEOARTHROSIS, UNSPECIFIED WHETHER GENERALIZED OR LOCALIZED, UNSPECIFIED
715.96	OSTEOARTHROSIS, UNSPECIFIED WHETHER GENERALIZED OR LOCALIZED, INVOLVING LOWER LEG
715.98	OSTEOARTHROSIS, UNSPECIFIED WHETHER GENERALIZED OR LOCALIZED, INVOLVING OTHER SPECIFIED SITES
716.1	TRAUMATIC ARTHROPATHY
716.66	UNSPECIFIED MONOARTHRITIS INVOLVING LOWER LEG
716.9	UNSPECIFIED ARTHROPATHY
716.90	UNSPECIFIED ARTHROPATHY, SITE UNSPECIFIED, UNSPECIFIED
716.91	UNSPECIFIED ARTHROPATHY INVOLVING SHOULDER REGION
716.95	UNSPECIFIED ARTHROPATHY INVOLVING PELVIC REGION AND THIGH
716.96	UNSPECIFIED ARTHROPATHY INVOLVING LOWER LEG
716.97	UNSPECIFIED ARTHROPATHY INVOLVING ANKLE AND FOOT
716.99	UNSPECIFIED ARTHROPATHY INVOLVING MULTIPLE SITES
717	INTERNAL DERANGEMENT OF KNEE
717.5	DERANGEMENT OF MENISCUS, NOT ELSEWHERE CLASSIFIED
717.7	CHONDROMALACIA OF PATELLA
717.8	OTHER INTERNAL DERANGEMENT OF KNEE
717.9	UNSPECIFIED INTERNAL DERANGEMENT OF KNEE
718	OTHER DERANGEMENT OF JOINT

718.0	ARTICULAR CARTILAGE DISORDER
718.00	ARTICULAR CARTILAGE DISORDER, UNSPECIFIED
718.4	CONTRACTURE OF JOINT
718.5	ANKYLOSIS OF JOINT
718.50	ANKYLOSIS OF JOINT, UNSPECIFIED
718.55	ANKYLOSIS OF JOINT, PELVIS
718.85	OTHER JOINT DERANGEMENT, NOT ELSEWHERE CLASSIFIED
718.88	OTHER JOINT DERANGEMENT, NOT ELSEWHERE CLASSIFIED, INVOLVING OTHER SPECIFIED SITES
718.98	UNSPECIFIED DERANGEMENT OF JOINT OF OTHER SPECIFIED SITES
719.4	PAIN IN JOINT
719.40	PAIN IN JOINT, UNSPECIFIED
719.41	PAIN IN JOINT INVOLVING SHOULDER REGION
719.42	PAIN IN JOINT INVOLVING UPPER ARM
719.43	PAIN IN JOINT INVOLVING FOREARM
719.44	PAIN IN JOINT INVOLVING HAND
719.45	PAIN IN JOINT INVOLVING PELVIC REGION AND THIGH
719.46	PAIN IN JOINT INVOLVING LOWER LEG
719.47	PAIN IN JOINT INVOLVING ANKLE AND FOOT
719.48	PAIN IN JOINT INVOLVING OTHER SPECIFIED SITES
719.49	PAIN IN JOINT INVOLVING MULTIPLE SITES
719.5	STIFFNESS OF JOINT, NOT ELSEWHERE CLASSIFIED
719.50	STIFFNESS OF JOINT, NOT ELSEWHERE CLASSIFIED, UNSPECIFIED
719.51	STIFFNESS OF JOINT, NOT ELSEWHERE CLASSIFIED, INVOLVING SHOULDER REGION
719.55	STIFFNESS OF JOINT, NOT ELSEWHERE CLASSIFIED, INVOLVING UNSPECIFIED SITE
719.58	STIFFNESS OF JOINT, NOT ELSEWHERE CLASSIFIED, INVOLVING OTHER SPECIFIED SITES
719.59	STIFFNESS OF JOINT, NOT ELSEWHERE CLASSIFIED, INVOLVING MULTIPLE SITES
719.6	OTHER SYMPTOMS REFERABLE TO JOINT
719.60	OTHER SYMPTOMS REFERABLE TO JOINT, UNSPECIFIED
719.65	OTHER SYMPTOMS REFERABLE TO JOINT, PELVIS
719.68	OTHER SYMPTOMS REFERABLE TO JOINT, INVOLVING OTHER SPECIFIED SITES
719.69	OTHER SYMPTOMS REFERABLE TO JOINT, INVOLVING MULTIPLE SITES
719.7	DIFFICULTY IN WALKING
719.70	DIFFICULTY IN WALKING, UNSPECIFIED
719.75	DIFFICULTY IN WALKING, PELVIS
719.8	OTHER SPECIFIED DISORDERS OF JOINT, INVOLVING OTHER SPECIFIED SITE

719.80	OTHER SPECIFIED DISORDERS OF JOINT, INVOLVING OTHER SPECIFIED SITE, UNSPECIFIED
719.85	OTHER SPECIFIED DISORDERS OF JOINT, INVOLVING OTHER SPECIFIED SITE, PELVIS
719.88	OTHER SPECIFIED DISORDERS OF JOINT, INVOLVING OTHER SPECIFIED SITES
719.89	OTHER SPECIFIED DISORDERS OF JOINT, INVOLVING MULTIPLE SITES
719.9	UNSPECIFIED DISORDER OF JOINT
719.90	UNSPECIFIED DISORDER OF JOINT, UNSPECIFIED
719.95	UNSPECIFIED DISORDER OF JOINT, PELVIS
719.98	UNSPECIFIED DISORDER OF JOINT
719.99	UNSPECIFIED DISORDER OF JOINT
720	ANKYLOSING SPONDYLITIS AND OTHER INFLAMMATORY SPONDYLOPATHIES
720.0	ANKYLOSING SPONDYLITIS
720.1	SPINAL ENTHESOPATHY
720.2	SACROILIITIS, NOT ELSEWHERE CLASSIFIED
720.8	OTHER INFLAMMATORY SPONDYLOPATHIES
720.81	INFLAMMATORY SPONDYLOPATHIES IN DISEASES CLASSIFIED ELSEWHERE
720.9	UNSPECIFIED INFLAMMATORY SPONDYLOPATHY
721	SPONDYLOSIS AND ALLIED DISORDERS
721.0	CERVICAL SPONDYLOSIS WITHOUT MYELOPATHY
721.1	CERVICAL SPONDYLOSIS WITH MYELOPATHY
721.2	THORACIC SPONDYLOSIS WITHOUT MYELOPATHY
721.3	LUMBOSACRAL SPONDYLOSIS WITHOUT MYELOPATHY
721.4	THORACIC OR LUMBAR SPONDYLOSIS WITH MYELOPATHY
721.41	SPONDYLOSIS WITH MYELOPATHY, THORACIC REGION
721.42	SPONDYLOSIS WITH MYELOPATHY, LUMBAR REGION
721.5	KISSING SPINE
721.6	ANKYLOSING VERTEBRAL HYPEROSTOSIS
721.7	TRAUMATIC SPONDYLOPATHY
721.8	OTHER ALLIED DISORDERS OF SPINE
721.9	SPONDYLOSIS OF UNSPECIFIED SITE
721.90	SPONDYLOSIS OF UNSPECIFIED SITE WITHOUT MENTION OF MYELOPATHY
721.91	SPONDYLOSIS OF UNSPECIFIED SITE WITH MYELOPATHY
722	INTERVERTEBRAL DISC DISORDERS
722.0	DISPLACEMENT OF CERVICAL INTERVERTEBRAL DISC WITHOUT MYELOPATHY
722.1	DISPLACEMENT OF THORACIC OR LUMBAR INTERVERTEBRAL DISC WITHOUT MYELOPATHY
722.10	DISPLACEMENT OF LUMBAR INTERVERTEBRAL DISC WITHOUT MYELOPATHY

722.11	DISPLACEMENT OF THORACIC INTERVERTEBRAL DISC WITHOUT MYELOPATHY
722.2	DISPLACEMENT OF INTERVERTEBRAL DISC, SITE UNSPECIFIED, WITHOUT MYELOPATHY
722.3	SCHMORL'S NODES
722.30	SCHMORL'S NODES, UNSPECIFIED
722.31	SCHMORL'S NODES OF THORACIC REGION
722.32	SCHMORL'S NODES OF LUMBAR REGION
722.4	DEGENERATION OF CERVICAL INTERVERTEBRAL DISC
722.5	DEGENERATION OF THORACIC OR LUMBAR INTERVERTEBRAL DISC
722.51	DEGENERATION OF THORACIC OR THORACOLUMBAR INTERVERTEBRAL DISC
722.52	DEGENERATION OF LUMBAR OR LUMBOSACRAL INTERVERTEBRAL DISC
722.6	DEGENERATION OF INTERVERTEBRAL DISC, SITE UNSPECIFIED
722.7	INTERVERTEBRAL DISC DISORDER WITH MYELOPATHY
722.71	INTERVERTEBRAL DISC DISORDER WITH MYELOPATHY, CERVICAL REGION
722.72	INTERVERTEBRAL DISC DISORDER WITH MYELOPATHY, THORACIC REGION
722.73	INTERVERTEBRAL DISC DISORDER WITH MYELOPATHY, LUMBAR REGION
722.8	POSTLAMINECTOMY SYNDROME
722.80	POSTLAMINECTOMY SYNDROME, UNSPECIFIED
722.81	POSTLAMINECTOMY SYNDROME OF CERVICAL REGION
722.82	POSTLAMINECTOMY SYNDROME OF THORACIC REGION
722.83	POSTLAMINECTOMY SYNDROME OF LUMBAR REGION
722.9	OTHER AND UNSPECIFIED DISC DISORDER
722.90	OTHER AND UNSPECIFIED DISC DISORDER OF UNSPECIFIED REGION
722.91	OTHER AND UNSPECIFIED DISC DISORDER OF CERVICAL REGION
722.92	OTHER AND UNSPECIFIED DISC DISORDER OF THORACIC REGION
722.93	OTHER AND UNSPECIFIED DISC DISORDER OF LUMBAR REGION
723	OTHER DISORDERS OF CERVICAL REGION
723.0	SPINAL STENOSIS IN CERVICAL REGION
723.1	CERVICALGIA
723.2	CERVICOCRANIAL SYNDROME
723.3	CERVICOBRACHIAL SYNDROME (DIFFUSE)
723.4	BRACHIAL NEURITIS OR RADICULITIS NOS
723.5	TORTICOLLIS, UNSPECIFIED
723.6	PANNICULITIS SPECIFIED AS AFFECTING NECK

723.7	OSSIFICATION OF POSTERIOR LONGITUDINAL LIGAMENT IN CERVICAL REGION
723.8	OTHER SYNDROMES AFFECTING CERVICAL REGION
723.9	UNSPECIFIED NEUROMUSCULOSKELETAL DISORDERS AND SYMPTOMS REFERABLE TO NECK
724	OTHER AND UNSPECIFIED DISORDERS OF BACK
724.0	SPINAL STENOSIS, OTHER THAN CERVICAL
724.00	SPINAL STENOSIS OF UNSPECIFIED REGION
724.01	SPINAL STENOSIS OF THORACIC REGION
724.02	SPINAL STENOSIS OF LUMBAR REGION
724.09	SPINAL STENOSIS OF OTHER REGION
724.1	PAIN IN THORACIC SPINE
724.2	LUMBAGO
724.3	SCIATICA
724.4	THORACIC OR LUMBOSACRAL NEURITIS OR RADICULITIS, UNSPECIFIED
724.5	BACKACHE, UNSPECIFIED
724.6	DISORDERS OF SACRUM
724.7	DISORDERS OF COCCYX
724.70	UNSPECIFIED DISORDERS OF COCCYX
724.79	OTHER DISORDERS OF COCCYX
724.8	OTHER SYMPTOMS REFERABLE TO BACK
724.9	OTHER UNSPECIFIED BACK DISORDERS
726	PERIPHERAL ENTHESOPATHIES AND ALLIED SYNDROMES
726.0	ADHESIVE CAPSULITIS OF SHOULDER
726.1	DISORDERS OF BURSAE AND TENDONS IN SHOULDER REGION, UNSPECIFIED
726.10	ROTATOR CUFF SYNDROME OF SHOULDER AND ALLIED DISORDERS
726.11	CALCIFYING TENDINITIS OF SHOULDER
726.2	OTHER AFFECTIONS OF SHOULDER REGION, NOT ELSEWHERE CLASSIFIED
726.32	LATERAL EPICONDYLITIS
726.91	EXOSTOSIS OF UNSPECIFIED SITE
727	OTHER DISORDERS OF SYNOVIUM, TENDON, AND BURSA
727.0	SYNOVITIS AND TENOSYNOVITIS
727.00	SYNOVITIS NOS
727.01	SYNOVITIS AND TENOSYNOVITIS IN DISEASES CLASSIFIED ELSEWHERE
727.04	RADIAL STYLOID TENOSYNOVITIS
727.05	OTHER TENOSYNOVITIS OF HAND AND WRIST
727.06	TENOSYNOVITIS OF FOOT AND ANKLE
727.09	OTHER SYNOVITIS AND TENOSYNOVITIS
727.2	SPECIFIC BURSITIDES OFTEN OF OCCUPATIONAL ORIGIN
727.3	OTHER BURSITIS DISORDERS
727.9	UNSPECIFIED DISORDER OF SYNOVIUM, TENDON, AND BURSA

728.1	MUSCULAR CALCIFICATION AND OSSIFICATION
728.10	CALCIFICATION AND OSSIFICATION, UNSPECIFIED
728.12	TRAUMATIC MYOSITIS OSSIFICANS
728.4	LAXITY OF LIGAMENT
728.5	HYPERMOBILITY SYNDROME
728.6	CONTRACTURE OF PALMAR FASCIA
728.7	OTHER FIBROMATOSES OF MUSCLE, LIGAMENT, AND FASCIA
728.8	OTHER DISORDERS OF MUSCLE, LIGAMENT, AND FASCIA
728.81	INTERSTITIAL MYOSITIS
728.85	SPASM OF MUSCLE
728.9	UNSPECIFIED DISORDER OF MUSCLE, LIGAMENT, AND FASCIA
729	OTHER DISORDERS OF SOFT TISSUES
729.0	RHEUMATISM, UNSPECIFIED AND FIBROSITIS
729.1	MYALGIA AND MYOSITIS, UNSPECIFIED
729.2	NEURALGIA, NEURITIS, AND RADICULITIS, UNSPECIFIED
729.3	PANNICULITIS, UNSPECIFIED
729.30	PANNICULITIS
729.4	FASCIITIS, UNSPECIFIED
729.5	PAIN IN LIMB
729.8	OTHER NEUROMUSCULOSKELETAL SYMPTOMS REFERABLE TO LIMBS
729.81	SWELLING OF LIMB
729.9	OTHER AND UNSPECIFIED DISORDERS OF SOFT TISSUE
734	PES PLANUS
736.81	UNEQUAL LEG LENGTH (ACQUIRED)
737.0	ADOLESCENT POSTURAL KYPHOSIS
737.1	KYPHOSIS
737.10	KYPHOSIS (ACQUIRED) (POSTURAL)
737.12	KYPHOSIS, POSTLAMINECTOMY
737.19	KYPHOSIS (ACQUIRED) OTHER
737.2	LORDOSIS (ACQUIRED)
737.20	LORDOSIS (ACQUIRED) (POSTURAL)
737.21	LORDOSIS, POSTLAMINECTOMY
737.22	OTHER POSTSURGICAL LORDOSIS
737.29	LORDOSIS (ACQUIRED) OTHER
737.3	SCOLIOSIS (AND KYPHOSCOLIOSIS), IDIOPATHIC
737.30	KYPHOSCOLIOSIS AND SCOLIOSIS
737.31	RESOLVING INFANTILE IDIOPATHIC SCOLIOSIS
737.32	PROGRESSIVE INFANTILE IDIOPATHIC SCOLIOSIS
737.34	THORACOGENIC SCOLIOSIS
737.39	KYPHOSCOLIOSIS AND SCOLIOSIS OTHER
737.4	CURDVATURE OF SPINE ASSOCIATED WITH OTHER CONDITIONS
737.40	CURVATURE OF SPINE, UNSPECIFIED
737.41	KYPHOSIS ASSOCIATED WITH OTHER CONDITIONS
737.42	LORDOSIS ASSOCIATED WITH OTHER CONDITIONS

737.43	SCOLIOSIS ASSOCIATED WITH OTHER CONDITIONS
737.8	OTHER CURVATURES OF SPINE ASSOCIATED WITH OTHER CONDITIONS
738	OTHER ACQUIRED NEUROMUSCULOSKELETAL DEFORMITY
738.2	ACQUIRED DEFORMITY OF NECK
738.3	ACQUIRED DEFORMITY OF CHEST AND RIB
738.4	ACQUIRED SPONDYLOLISTHESIS
738.5	OTHER ACQUIRED DEFORMITY OF BACK OR SPINE
738.6	ACQUIRED DEFORMITY OF PELVIS
738.9	ACQUIRED NEUROMUSCULOSKELETAL DEFORMITY OF UNSPECIFIED SITE
739	NONALLOPATHIC LESIONS, NOT ELSEWHERE CLASSIFIED
739.0	NONALLOPATHIC LESIONS OF HEAD REGION, NOT ELSEWHERE CLASSIFIED
739.1	NONALLOPATHIC LESIONS OF CERVICAL REGION, NOT ELSEWHERE CLASSIFIED
739.2	NONALLOPATHIC LESIONS OF THORACIC REGION, NOT ELSEWHERE CLASSIFIED
739.3	NONALLOPATHIC LESIONS OF LUMBAR REGION, NOT ELSEWHERE CLASSIFIED
739.4	NONALLOPATHIC LESIONS OF SACRAL REGION, NOT ELSEWHERE CLASSIFIED
739.5	NONALLOPATHIC LESIONS OF PELVIC REGION, NOT ELSEWHERE CLASSIFIED
739.6	NONALLOPATHIC LESIONS OF LOWER EXTREMITIES, NOT ELSEWHERE CLASSIFIED
739.7	NONALLOPATHIC LESIONS OF UPPER EXTREMITIES, NOT ELSEWHERE CLASSIFIED
739.8	NONALLOPATHIC LESIONS OF RIB CAGE, NOT ELSEWHERE CLASSIFIED

740-759.1.1 Congenital Anomalies

754.2	CONGENITAL NEUROMUSCULOSKELETAL DEFORMITIES OF SPINE
755.69	OTHER CONGENITAL ANOMALIES OF LOWER LIMB, INCLUDING PELVIC GIRDLE
756.1	CONGENITAL ANOMALIES OF SPINE
756.11	CONGENITAL SPONDYLOLYSIS, LUMBOSACRAL REGION
756.12	SPONDYLOLISTHESIS, CONGENITAL
756.13	ABSENCE OF VERTEBRA, CONGENITAL
756.14	HEMIVERTEBRA
756.15	FUSION OF SPINE (VERTEBRA), CONGENITAL
756.16	KLIPPEL-FEIL SYNDROME
756.17	SPINA BIFIDA OCCULTA
756.19	OTHER CONGENITAL ANOMALIES OF SPINE
756.2	CERVICAL RIB

780-799	**Symptoms, Signs, and Ill-Defined Conditions**
780.4	DIZZINESS AND GIDDINESS
780.7	MALAISE AND FATIGUE
780.8	HYPERHIDROSIS
780.9	OTHER GENERAL SYMPTOMS
781	OTHER SYMPTOMS INVOLVING NERVOUS AND NEUROMUSCULOSKELETAL SYSTEMS
781.0	ABNORMAL INVOLUNTARY MOVEMENTS
781.9	OTHER SYMPTOMS INVOLVING NERVOUS AND NEUROMUSCULOSKELETAL SYSTEMS
784	SYMPTOMS INVOLVING HEAD AND NECK
784.0	HEADACHE
784.1	THROAT PAIN
786.5	CHEST PAIN
786.50	UNSPECIFIED CHEST PAIN
788.3	ENURESIS, NOCTURNAL
789.0	COLIC, INFANTILE, ABDOMINAL, INTESTINAL, SPASMODIC
800-999	**Injury**
839	DISLOCATION, NOT ELSEWHERE CLASSIFIED
839.0	DISLOCATION, CERVICAL VERTEBRA
839.00	DISLOCATION, CERVICAL VERTEBRA, CLOSED
839.01	DISLOCATION FIRST CERVICAL VERTEBRA, CLOSED
839.02	DISLOCATION SECOND CERVICAL VERTEBRA, CLOSED
839.03	DISLOCATION THIRD CERVICAL VERTEBRA, CLOSED
839.04	DISLOCATION FOURTH CERVICAL VERTEBRA, CLOSED
839.05	DISLOCATION FIFTH CERVICAL VERTEBRA, CLOSED
839.06	DISLOCATION SIXTH CERVICAL VERTEBRA, CLOSED
839.07	DISLOCATION SEVENTH CERVICAL VERTEBRA, CLOSED
839.08	DISLOCATION MULTIPLE CERVICAL VERTEBRAE, CLOSED
839.2	CLOSED DISLOCATION, THORACIC AND LUMBAR VERTEBRA
839.20	CLOSED DISLOCATION, LUMBAR VERTEBRA
839.21	CLOSED DISLOCATION, THORACIC VERTEBRA
840	SPRAINS AND STRAINS OF SHOULDER AND UPPER ARM
840.0	ACROMIOCLAVICULAR (JOINT) (LIGAMENT) SPRAIN
840.1	CORACOCLAVICULAR (LIGAMENT) SPRAIN
840.2	CORACOHUMERAL (LIGAMENT) SPRAIN
840.3	INFRASPINATUS (MUSCLE) (TENDON) SPRAIN
840.4	ROTATOR CUFF (CAPSULE) SPRAIN
840.5	SUBSCAPULARIS (MUSCLE) SPRAIN
840.6	SUPRASPINATUS (MUSCLE) (TENDON) SPRAIN
840.8	SPRAIN OF OTHER SPECIFIED SITES OF SHOULDER AND UPPER ARM
840.9	SPRAIN OF UNSPECIFIED SITE OF SHOULDER AND UPPER ARM

841	SPRAINS AND STRAINS OF ELBOW AND FOREARM
841.0	RADIAL COLLATERAL LIGAMENT SPRAIN
841.1	ULNAR COLLATERAL LIGAMENT SPRAIN
841.2	RADIOHUMERAL
841.3	ULNOHUMERAL (JOINT) SPRAIN
841.8	SPRAIN OF OTHER SPECIFIED SITES OF ELBOW AND FOREARM
841.9	SPRAIN OF UNSPECIFIED SITE OF ELBOW AND FOREARM
842	SPRAINS AND STRAINS OF WRIST AND HAND
842.0	WRIST SPRAIN
842.00	SPRAIN OF UNSPECIFIED SITE OF WRIST
842.01	SPRAIN OF CARPAL (JOINT) OF WRIST
842.02	SPRAIN OF RADIOCARPAL (JOINT) (LIGAMENT) OF WRIST
842.09	OTHER WRIST SPRAIN
842.1	HAND SPRAIN
842.10	SPRAIN OF UNSPECIFIED SITE OF HAND
842.11	SPRAIN OF CARPOMETACARPAL (JOINT) OF HAND
842.12	SPRAIN OF METACARPOPHALANGEAL (JOINT) OF HAND
842.13	SPRAIN OF INTERPHALANGEAL (JOINT) OF HAND
842.19	OTHER HAND SPRAIN
843	SPRAINS AND STRAINS OF HIP AND THIGH
843.0	ILIOFEMORAL (LIGAMENT) SPRAIN
843.8	SPRAIN OF OTHER SPECIFIED SITES OF HIP AND THIGH
843.9	SPRAIN OF UNSPECIFIED SITE OF HIP AND THIGH
844	SPRAINS AND STRAINS OF KNEE AND LEG
844.0	SPRAIN OF LATERAL COLLATERAL LIGAMENT OF KNEE
844.1	SPRAIN OF MEDIAL COLLATERAL LIGAMENT OF KNEE
844.2	SPRAIN OF CRUCIATE LIGAMENT OF KNEE
844.3	SPRAIN OF TIBIOFIBULAR (JOINT) (LIGAMENT) SUPERIOR, OF KNEE
844.8	SPRAIN OF OTHER SPECIFIED SITES OF KNEE AND LEG
844.9	SPRAIN OF UNSPECIFIED SITE OF KNEE AND LEG
845	SPRAINS AND STRAINS OF ANKLE AND FOOT
845.0	ANKLE SPRAIN
845.00	UNSPECIFIED SITE OF ANKLE SPRAIN
845.01	DELTOID (LIGAMENT), ANKLE SPRAIN
845.02	CALCANEOFIBULAR (LIGAMENT) ANKLE SPRAIN
845.03	TIBIOFIBULAR (LIGAMENT) SPRAIN, DISTAL
845.09	OTHER ANKLE SPRAIN
845.1	FOOT SPRAIN
845.10	UNSPECIFIED SITE OF FOOT SPRAIN
845.11	TARSOMETATARSAL (JOINT) (LIGAMENT) SPRAIN
845.12	METATARSOPHALANGEAL (JOINT) SPRAIN
845.13	INTERPHALANGEAL (JOINT), TOE SPRAIN
845.19	OTHER FOOT SPRAIN
846	SPRAINS AND STRAINS OF SACROILIAC REGION
846.0	LUMBOSACRAL (JOINT) (LIGAMENT) SPRAIN

846.1	SACROILIAC (LIGAMENT) SPRAIN
846.2	SACROSPINATUS (LIGAMENT) SPRAIN
846.3	SACROTUBEROUS
846.8	OTHER SPECIFIED SITES OF SACROILIAC REGION SPRAIN
846.9	UNSPECIFIED SITE OF SACROILIAC REGION SPRAIN
847	SPRAINS AND STRAINS OF OTHER AND UNSPECIFIED PARTS OF BACK
847.0	NECK SPRAIN
847.1	THORACIC SPRAIN
847.2	LUMBAR SPRAIN
847.3	SPRAIN OF SACRUM
847.4	SPRAIN OF COCCYX
847.9	SPRAIN OF UNSPECIFIED SITE OF BACK
848	OTHER AND ILL-DEFINED SPRAINS AND STRAINS
848.1	JAW SPRAIN
848.2	THYROID REGION SPRAIN
848.3	SPRAIN OF RIBS
848.4	STERNUM SPRAIN
848.42	CHONDROSTERNAL (JOINT) SPRAIN
848.5	PELVIC SPRAIN
848.8	OTHER SPECIFIED SITES OF SPRAINS AND STRAINS
848.9	UNSPECIFIED SITE OF SPRAIN AND STRAIN
850.9	CONCUSSION, UNSPECIFIED
905.7	LATE EFFECT OF SPRAIN AND STRAIN WITHOUT MENTION OF TENDON INJURY
905.8	LATE EFFECT OF TENDON INJURY
907.3	LATE EFFECT OF INJURY TO NERVE ROOT(S), SPINAL PLEXUS(ES), AND OTHER NERVES OF TRUNK
953.0	INJURY TO CERVICAL NERVE ROOT
953.1	INJURY TO DORSAL NERVE ROOT
953.2	INJURY TO LUMBAR NERVE ROOT
953.3	INJURY TO SACRAL NERVE ROOT
953.4	INJURY TO BRACHIAL PLEXUS
953.5	INJURY TO LUMBOSACRAL PLEXUS
954	INJURY TO CERVICAL SYMPATHETIC NERVE, EXCLUDING SHOULDER AND PELVIC GIRDLES
956	INJURY TO SCIATIC NERVE
959.2	OTHER AND UNSPECIFIED INJURY TO SHOULDER AND UPPER ARM
959.6	OTHER AND UNSPECIFIED INJURY TO HIP AND THIGH
959.7	OTHER AND UNSPECIFIED INJURY TO KNEE, LEG, ANKLE, AND FOOT

COST-EFFECTIVENESS OF MEDICAL AND CHIROPRACTIC CARE FOR ACUTE AND CHRONIC LOW BACK PAIN

Mitchell Haas, DC, MA,[a] Rajiv Sharma, PhD,[b] and Miron Stano, PhD[c]

ABSTRACT

Objectives: To identify relative provider costs, clinical outcomes, and patient satisfaction for the treatment of low back pain (LBP).

Methods: This was a practice-based, nonrandomized, comparative study of patients self-referring to 60 doctors of chiropractic and 111 medical doctors in 51 chiropractic and 14 general practice community clinics over a 2-year period. Patients were included if they were at least 18 years old, ambulatory, and had low back pain of mechanical origin (n = 2780). Outcomes were (standardized) office costs, office costs plus referral costs for office-based care and advanced imaging, pain, functional disability, patient satisfaction, physical health, and mental health evaluated at 3 and 12 months after the start of care. Multiple regression analysis was used to correct for baseline differences between provider types.

Results: Chiropractic office costs were higher for both acute and chronic patients ($P < .01$). When referrals were included, there were no significant differences in either group between provider types ($P > .20$). Acute and chronic chiropractic patients experienced better outcomes in pain, functional disability, and patient satisfaction ($P < .01$); clinically important differences in pain and disability improvement were found for chronic patients only.

Conclusions: Chiropractic care appeared relatively cost-effective for the treatment of chronic LBP. Chiropractic and medical care performed comparably for acute patients. Practice-based clinical outcomes were consistent with systematic reviews of spinal manipulation efficacy: manipulation-based therapy is at least as good as and, in some cases, better than other therapeusis. This evidence can guide physicians, payers, and policy makers in evaluating chiropractic as a treatment option for low back pain. (J Manipulative Physiol Ther 2005;28:555-563)

Key Indexing Terms: *Low Back Pain; Chiropractic Care; Medical Care; Cost-Effectiveness*

Healthcare costs for the treatment of back pain are substantial. A recent incremental spending model for the United States indicates that the additional costs associated with back pain patients represent 2.5% of national health care expenditures[1] (a value expected to reach to $48 billion for 2005). With wide variations in spending patterns across patients with different clinical, socioeconomic, and demographic characteristics, the authors concluded that more cost-effective and targeted treatments could produce significant health care savings.[1] With most adults experiencing back pain at some point in their lives,[2,3] such treatments would represent an important public health improvement.

Because nonmedical providers, most notably chiropractors, provide a substantial portion of care for patients with low back pain (LBP),[4-7] the relative efficacy and cost-effectiveness of chiropractic and medical care have emerged as important issues in the broader debate on evidence-based medicine. The growth of managed care and other gatekeeper mechanisms that restrict patient access to both medical

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specialists and nonmedical providers have heightened the need for additional evidence that could be used to better allocate health care dollars.

There is a considerable body of randomized trials on the efficacy of spinal manipulation for the treatment of LBP; this evidence is summarized in the most recent systematic reviews.[8,9] Assendelft et al[8] concluded that manipulation is superior to placebo and sham procedures but no better than other commonly used therapies. In a companion review, Cherkin et al[10] concluded that manipulation is at least as effective as other therapies. Bronfort et al[9] found no treatment superior to manipulation and concluded that manipulation is a viable treatment option for acute and chronic LBP. More recent trials have also supported efficacy of spinal manipulation.[11-14] Our practice-based, nonrandomized comparative study showed a clinically important advantage for chiropractic care over medical care for chronic patients and a marginal advantage for acute patients.[15]

Early cost studies showed both lower[16-18] and higher[19-21] costs for chiropractic care than for other interventions. These studies had diverse designs, payment types, and analytic methods. In a comprehensive literature review of occupational LBP, Baldwin et al[22] concluded that chiropractic and medical care are equally effective, but because of conflicting evidence and methodologic shortcomings, evidence for relative cost-effectiveness is inconclusive. No studies combined sufficient sample size, confounder controls, and high-quality cost data.[22] Solomon et al[23] were similarly critical of study methodology.

Since these reviews, a large managed care network in California found that members who received chiropractic coverage had 12% lower annual health care expenditures (1.6% lower after adjusting for member risk characteristics) than members without the coverage.[24] Patients with the chiropractic benefit had lower back pain cost per episode of back pain, as well as lower rates of surgery and hospitalization. A randomized trial in the United Kingdom found that spinal manipulation alone or with exercise can be the best strategy, so long as a quality-adjusted life-year is valued above £3800 (then approximately US $5700).[25] Another randomized trial in Sweden reported that costs and outcomes were generally similar for physiotherapy and chiropractic.[26,27] The authors concluded that the therapies were equivalent from a cost-effectiveness perspective.

A preliminary report from our study indicated that mean direct in-office costs of patients treated by chiropractors were 74% higher (median, 39% higher) than those treated by medical physicians.[28] However, the report did not distinguish acute from chronic patients, and cost and outcomes comparisons were unadjusted for baseline group differences. A potentially more important limitation was the exclusion of referral and advanced imaging costs.

This report fills these gaps by applying multiple regression analysis to cost as well as outcomes data. It contrasts analysis of office costs with and without costs of referral and advance imaging. Analysis was conducted separately for acute and chronic patients with LBP, in accordance with the original study design. It also includes a more extensive set of patient outcomes measures that permit estimation of incremental cost-effectiveness ratios. Analysis was conducted for one short-term and one long-term time point; 3 and 12 months were chosen a priori for this report.

Methods

Design

Data were from a prospective, longitudinal, practice-based, nonrandomized comparative study of self-referring patients with chronic and acute LBP treated by doctors of chiropractic (DCs) and primary-care medical doctors (MDs).[15,29,30] This comparative study design is considered appropriate for cost-effectiveness analysis, although it does not yield the level of evidence of a randomized trial.[31-33] The study enrolled 2872 patients over a 2-year period (1994-1996) from the practices of 60 DCs and 111 MDs in 51 DC and 14 general practice community clinics. Except for one medical clinic located in Vancouver, Washington, all medical and chiropractic clinics were located in Oregon. Patient data were obtained through self-administered questionnaires at the initial visit and mailed follow-up questionnaires. Practitioners were not asked to alter their usual management of LBP for the study.

Participants

Patients with the primary complaint of acute or chronic LBP were eligible to participate if they were at least 18 years old, ambulatory, and English literate. Pain had to be of mechanical origin (ie, not due to tumors, inflammatory disease, or organic referred pain). Patients were excluded if they had received care from a provider of the same type as the enrolling clinician within the previous 6 weeks, were pregnant, or had contraindications to spinal manipulation. All participants signed a consent form that explained the study and the participant's rights. The study was approved for protection of human subjects by the Western States Chiropractic College Institutional Review Board.

Treatment

The study clinicians provided a variety of health services.[28,29] The salient features of chiropractic care were spinal manipulation, physical modalities, exercise plan, and self-care education. Medical patients received prescription drugs, exercise plan, and self-care advice; approximately 25% were referred for physical therapy.

Outcome and Baseline Measures

Information collected at the baseline included history of LBP before the baseline episode, duration and severity of current episode, as well as comorbidities (arthritis, respiratory conditions, gastrointestinal problems, gynecologic problems, hypertension, and other chronic conditions), physical and mental health status, demographics, insurance characteristics, confidence in successful treatment outcome, and a depression screen.[15] Severity of pain and disability were measured 7 times after the baseline visit, only two of which are included in this report. Physical/mental health and patient satisfaction were measured at 12 months. Clinical and satisfaction outcomes were evaluated on 100-point scales. Pain severity, a primary clinical outcome, was measured on a 100-mm Visual Analogue Scale (VAS): "no pain" (0) to "excruciating pain" (100). The VAS is a commonly used, validated pain measure.[34] Functional disability, the other primary clinical outcome, was measured with the Revised Oswestry Disability Questionnaire, a 10-item, 100-point scale assessing pain and daily activities. A higher score on this valid[35] and responsive[36,37] instrument indicates greater disability. Physical and mental health were evaluated with subscales of the Short Form (SF)-12 questionnaire, a validated short version of the Medical Outcomes Study SF-36.[38,39] A 3-item depression questionnaire appended to the SF-12 was used to screen for major depression/dysthymia.[40] Two questions measured trust of the provider types, and one question evaluated confidence in treatment success.[41] These 3 were measured on 6-point Likert scales dichotomized for the analysis. Chronic LBP was defined as an episode of at least 7 weeks duration at enrollment.[42] Patient data were obtained using self-administered questionnaires.

Provider practice activities and referrals used in the cost analysis were identified by chart audit for a period of 12 months after baseline. The computation of office-based costs, including x-ray and prescribed medication, have been described elsewhere.[28] Estimates of office costs were based on Medicare/ChiroCode relative value units and Medicare conversion factors. This methodology, increasingly common in economic analyses,[43] provides a standardized measure of costs that does not depend either on the charges, which often do not reflect transaction prices or on the specific amounts collected by the providers in the study.

Estimated total costs for this study included office-based costs plus the estimated costs of advanced imaging, surgical consultation, and referrals to physical therapists. We imputed $600 for advanced imaging costs using data found in Mosely.[16] Our study did not permit us to determine the actual services patients received when referred. We therefore imputed $450 for evaluation by a surgeon to any patient with one or more surgical referrals. This was based on charges data per claimant found in Mushinski,[44] adjusted for the proportion of provider charges that are actually reimbursed. We also imputed $220 to any patient with one or more referrals to a physical therapist, based on Cherkin et al[21] All costs are in constant 1995 US dollars.

Statistical Analysis

The analysis consisted of forced-entry, multiple regression models conducted separately for each cost and clinical outcome at 3 and 12 months after the initial study visit. Acute and chronic LBP were analyzed separately because of the long recognized distinction between these conditions[42]; 2780 patients who could be identified as acute or chronic were included in the analysis. We examined the impact of provider type on total costs (primary cost analysis) and office costs defined above. The effects of provider type on the primary clinical outcomes, pain and disability, have been reported for all follow-up.[15] Summary scores for patient satisfaction and improvement in physical and mental health at 12 months were secondary outcomes not analyzed previously.

The effects of provider type were adjusted for all independent variables in the models. The variables entered in the models were selected a priori based on general interest in research studies (eg, age and sex) or because they have been previously reported to affect low back outcomes.[45] An additional variable was added to help control for desirability of physician type. This consisted of the difference in trust in chiropractors and MDs, measured on 6-point Likert scales, that we found to be predictive of choice of type of doctor.[30] For clinical outcomes, independent variables consisted of baseline severity, LBP history, referred pain above knee, referred pain below knee, depression, comorbidity, sex, age, smoking, a measure of relative desirability of care type, and interaction effects.[15] Independent variables for cost analysis additionally included variables that were not found previously to be predictors of clinical outcomes: health insurance, marital status, and income. The incremental cost of additional clinical improvements associated with treatment by chiropractors rather than MDs was then computed.

As a secondary analysis, a natural log transformation was applied to total and office cost variables used in the regressions to take into account skewness of these variables. Incremental log costs and associated cost ratios were computed.

Statistical significance was set as $P < .01$, and a clinical important difference between groups for the primary outcomes was set at 10 points a priori.[15] Analyses were performed using SAS Version 8.2 (SAS Institute Inc, Cary, NC).[46]

Results

Response rates for the clinical outcomes questionnaires were 66.0% at 3 months and 62.6% at 12 months; these were uniform across groups. Sensitivity analyses revealed no effect of missing data on adjusted group differences. There were very small differences in primary outcomes

Table 1. *Baseline characteristics*

	Chronic patients		Acute patients	
	DC (n = 527)	MD (n = 310)	DC (n = 1328)	MD (n = 615)
Demographic characteristics				
Age	42.2 (14.4)	39.4 (12.7)*	42.1 (12.9)	38.5 (12.1)*
Sex: female (%)	55.4	52.6	47.7	46.7
Race: white non-Hispanic (%)	91.8	88.7	91.6	92.1
Marital status: married (%)	60.2	53.6	63.3	60.7
Education: college degree (%)	28.5	25.9	33.8	33.6
Income: <$12 000 (%)	9.5	26.5*	7.1	11.7
Payment Characteristics				
Out of pocket/no insurance (%)	47.0	5.5*	41.5	8.2*
Health insurance (%)	38.8	76.8*	41.8	75.7*
Workers' compensation (%)	5.9	6.8	6.7	9.7
Medicaid/Oregon Health Plan (%)	2.6	20.1*	1.2	10.5*
Complaint characteristics				
Pain intensity (100-point VAS)	47.8 (24.5)	54.0 (24.0)*	52.0 (24.2)	58.7 (24.1)*
Functional disability (100-point RODQ)	38.5 (15.6)	49.7 (17.9)*	41.8 (18.0)	48.6 (17.9)*
Pain location (%)		*		
Back pain only	40.8	27.2	50.8	48.0
Pain radiating above knee	30.7	32.6	29.1	31.6
Pain radiating below knee	28.5	40.2	20.0	20.5
Previous history of LBP (%)	89.2	84.5	90.5	84.2*
Health Status Characteristics				
General Health Status (SF-12)				
Physical health	56.0 (18.4)	43.7 (20.0)*	58.7 (18.9)	54.6 (19.0)*
Mental health	63.5 (18.9)	58.0 (21.1)*	68.6 (18.2)	66.1 (19.0)*
Present comorbidity (any of 8)[a] (%)	54.4	61.5	50.7	43.5*
Depression: yes (%)	38.8	45.4	34.0	39.1
Smoking: yes (%)	22.0	31.4*	23.0	26.7
Stress: high (5 or 6 on 6-point Likert scale) (%)				
Physical	25.7	41.8*	23.7	30.4*
At work	27.8	31.1	28.5	31.5
At home	14.6	21.5*	11.8	13.4
Financial	22.4	35.0*	16.8	21.1
Health care attitudes (4-6 on 6-point Likert scale) (%)				
Trust MDs	79.7	90.0*	84.8	95.4*
Trust DCs	94.4	58.8*	95.5	63.9*
Confidence in chosen provider	83.5	61.3*	93.0	74.6*

Values are presented as mean (SD) or percentages. Comparisons are made between chronic DC and MD patients and between acute DC and MD patients with a 2-tailed t test for continuous data or χ^2 for categorical data. RODQ, Revised Oswestry Disability Questionnaire.

[a] Comorbidity: headaches, arthritis, asthma/allergies, GI problems, gynecologic problems, hypertension, and/or other chronic conditions.

* $P < .01$.

between the results from the subsample of patients with complete data over 4 years and the entire sample.[15] In addition, predictive models showed no effect of missing data on the primary outcomes at 12 months.[47] Complete data for all variables included in cost analyses were available for 38% of chronic and 50% of acute patients. Most data were available for almost all patients, so we were able to accurately profile costs incurred by those excluded because of missing data. The costs incurred by such patients differed little from costs of patients with complete data.[15]

Patient Characteristics

The demographic, payment, complaint, general health, and psychosocial characteristics for the 4 cohorts are presented in Table 1. Most differences between MD and DC cohorts were statistically significant. However, only a few of these differences were clinically important and emerged as predictors of clinical or cost outcomes. For chronic patients, MD patients had greater disability, poorer physical health, and greater prevalence of pain radiating below the knee. For the acute cohorts, less than 10% of MD patients and more than 40% of DC patients paid for care out of pocket.

Cost Outcomes

Table 2 summarizes unadjusted costs. The impact of the inclusion of costs incurred outside clinicians' offices on the costliness of MD and DC treatment is notable. Patients

Table 2. *Cost and clinical outcomes*

	Chronic DC		Chronic MD		Acute DC		Acute MD	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
3 months								
Office costs	$174	$195	$107	$75	$161	$183	$90	$66
Median	$104		$84		$101		$69	
Total costs	$180	$209	$212	$253	$171	$202	$141	$183
Median	$108		$103		$102		$70	
Pain	22.8	25.4	16.7	29.9	39.9	27.3	41.8	30.3
Disability	15.3	16.1	12.5	17.7	28.3	20.4	30.0	21.3
12 mo								
Office costs	$222	$288	$146	$153	$206	$284	$113	$117
Median	$116		$103		$121		$82	
Total costs	$232	$311	$281	$355	$218	$305	$176	$245
Median	$123		$135		$124		$89	
Pain	23.9	27.0	18.9	31.8	40.9	27.0	41.9	28.5
Disability	16.1	17.1	14.4	19.4	29.4	20.6	31.0	21.0
Physical health	14.7	18.3	15.8	20.8	20.3	19.9	20.5	19.6
Mental health	4.9	20.5	4.9	19.5	6.7	18.9	4.9	18.4
Satisfaction	86.4	19.9	71.3	22.7	90.2	16.4	76.0	22.6

All clinical outcomes were normalized to a 100-point scale. A higher value denotes greater satisfaction or greater improvement in pain, disability, physical health, and mental health. All improvement scores were statistically significant ($P < .01$).

Table 3. *Adjusted mean differences (DC-MD) in costs and outcomes improvement*

	Chronic patients					Acute patients				
	Mean	SE	*P*	CER1	CER2	Mean	SE	*P*	CER1	CER2
3 months										
Office costs	$142	$37	.000			$93	$25	.000		
Office costs (log)	0.69	0.22	.002			0.48	0.15	.002		
Total costs	$5	$52	.931			$42	$35	.224		
Total costs (log)	0.22	0.25	.379			0.18	0.17	.288		
Pain	10.5	2.0	.000	$13.5	$0.4	3.6	1.3	.005	$25.7	$11.7
Disability	8.8	1.6	.000	$16.1	$0.5	3.9	1.1	.000	$23.8	$10.8
12 months										
Office costs	$158	$60	.009			$112	$38	.003		
Office costs (log)	0.58	0.23	.014			0.39	0.16	.017		
Total costs	$1	$80	.993			$43	$47	.352		
Total costs (log)	0.10	0.26	.715			0.13	0.18	.453		
Pain	7.3	2.1	.000	$21.6	$0.1	3.6	1.3	.007	$31.2	$12.0
Disability	5.4	1.7	.001	$29.2	$0.1	2.7	1.1	.012	$41.7	$16.1
Physical health	3.0	3.6	.396	$52.2	$0.2	9.2	2.5	.000	$12.2	$4.7
Mental health	1.2	3.7	.757	$136.4	$0.7	5.4	2.5	.032	$20.8	$8.0
Satisfaction	18.1	4.9	.000	$8.7	$0.0	14.0	3.1	.000	$8.0	$3.1

Adjusted mean differences between DC and MD are the predicted mean differences from the regression models. Positive values indicate greater cost or greater improvement in outcomes for DC patients. CER indicates the incremental cost-effectiveness ratios: adjusted mean difference in cost divided by adjusted mean difference in outcomes. Office costs were used in the numerator of CER1, and total costs were used in the numerator of CER2.

treated by DCs were referred to outside providers infrequently. As a result, mean total costs for DC patients were a little higher than office costs ($6-$10 at 3 months and $10-$14 at 12 months). On the other hand, for patients treated by MDs, referral and advanced imaging accounted for a large fraction of mean total costs (acute, 24%-36% or $51-$105; chronic, 48%-50% or $63-$135).

Office costs for DC care were 78% to 82% higher than MD care for acute patients and 52% to 60% higher for chronic patients. In contrast, total costs of DC care were only 22% greater than MD care for acute patients and 16% less than MD care for chronic patients.

Table 3 reports adjusted differences in costs and outcomes. Office costs for chiropractic treatment had higher

costs for both chronic and acute patients at the 3- and 12-month intervals ($93-$158, $P < .01$). However, when costs of advanced imaging and referrals were included (primary analysis), costs of DC treatment were not significantly different from those of medical treatment at either the 3-month or the 12-month interval. Adjusted differences were $5 and $1 at the two intervals for chronic patients ($P > .90$) and $42 and $43 for acute patients ($P > .20$). The impact of chiropractic treatment on costs remained unchanged when a log transform of costs was used in the analysis. Adjusted DC office costs were 1.5 to 2.0 times greater ($P < .01$), whereas DC total costs were only 1.1 to 1.2 times greater and not statistically significant ($P > .25$).

The regression models not only adjusted outcomes for group differences in the independent variables listed under statistical analysis above, but also identified the contribution of predictor variables to the outcomes. The large volume of data necessitates that these results be published elsewhere.

Clinical Outcomes

Table 2 shows clinically important and statistically significant, within-group improvement in pain, functional disability, and general health outcomes for all 4 patient cohorts. Patient satisfaction can be considered high for DC patients and somewhat more moderate for MD patients.

Improvement in the pain and disability (primary) outcomes was significantly greater for DC care in both acute and chronic patients. Adjusted mean differences (AMD) in these outcomes were clinically important for chronic patients at 3 months (AMD, 10.5 and 8.8, $P < .0005$). The advantage for DC care in acute patients was small at both 3 and 12 months (AMD <4, $P < .01$). There was little difference in improvement between DC and MD patients in physical and mental health. One exception was physical health in acute patients (AMD, 9.2; $P < .0005$). Patient satisfaction favored DC care for acute and chronic patients (AMD, 14-18; $P < .0005$).

Adjusted Incremental Cost-Effectiveness Ratios

The additional costs per unit advantage in outcomes for DC care are presented in Table 3. Of note, ratios computed for office costs alone were considerably higher than ratios computed for total costs. For chronic patients, the total cost ratios ranged from approximately $0.1 to $0.5 per point advantage. Specifically, for the primary outcomes at 3 months, there was a $5 additional cost for a 10.5-point advantage in pain and an 8.8-point advantage in improvement. At 12 months, there was only a $1 additional cost but for more modest 7.3- and 5.4-point improvements in these outcomes. For acute patients, the cost ratios were between $24 and $25 per point at 3 months and $8 to $42 per point at 12 months. The cost ratios reflect greater cost and smaller advantage in primary outcomes than for chronic patients. Also notable are the small ratios for large differential satisfaction in both acute and chronic patients.

Discussion

Back pain is experienced by 80% of adults during their lives[2,3] and accounts for 2.5% of US health care expenditures.[1] Arguably, the relative cost-effectiveness of medical and chiropractic care is an urgent economic and health policy issue, one for which evidence is especially limited. Much of the recent work on cost-effectiveness has been conducted abroad.[25-27] With cost structures in the United States that are very different from other countries,[48,49] our work fills important information gaps that can help with policy and health plan decisions. We include a broad set of outcomes indicators as well as comprehensive cost data for large samples of patients. Furthermore, we have been able to adjust both costs and outcomes for a variety of confounding factors to provide clear relative cost indicators.

Our study had several important findings. First, office costs alone are not appropriate outcomes for a comparison of medical and chiropractic care. Medical office costs do not include physical therapy, whereas physical modalities are usually performed in chiropractic offices.[29] These and other referral costs (advanced imaging and other provider care) appear to be the great equalizers for medical and chiropractic care. The appropriateness of advanced imaging and referral were not investigated in this study. Clearly, over- and underuse could have a dramatic effect on relative cost-effectiveness.

Chiropractic appears relatively cost-effective compared with medical care for the treatment of chronic LBP in pain and functional disability improvement. This was evidenced by a relative clinical benefit, particularly in the short term, concomitant with no difference in total costs. The picture for acute patients is somewhat less clear. There was only a small advantage for chiropractic care in outcomes with additional but statistically insignificant costs.

Two recent randomized trials addressed cost-effectiveness of manipulation/chiropractic care. Using a formal analysis, a trial in the United Kingdom found that manipulation is cost-effective for back pain.[25] Kominski et al[50] found, at an 18-month follow-up, that chiropractic care was more expensive than medical care, but chiropractic care with physical modalities was less expensive than medical care with physical therapy. Outcomes were comparable across the 4 groups. This study supports our contention that ancillary care such as physical modalities need to be considered in cost-effectiveness studies. The absence of group differences in outcomes at 18 months is consistent with our study findings reported previously; chiropractic and medical care differences vanished between 12 and 24 months.[15]

Although most cost comparisons have been favorable to chiropractic, several studies for the United States have

reported that chiropractic care costs more than treatment provided by primary care physicians.[19,20] For example, general practitioners had the lowest charges over episodes of care, with DCs and orthopedists the highest, in a study using 1974 to 1982 data from the RAND Health Insurance Experiment.[19]

In particular, our findings were in contrast to the seminal, nonrandomized comparative study by Carey et al,[20] who found equivalent outcomes but the highest costs for urban DCs and orthopedists and the lowest for primary care and health maintenance organizations. However, their cost data reflected charges rather than payments, which are often much lower than charges. Their costs were also evaluated for a single episode, rather than a fixed period. Many investigators believe that the episode is the appropriate unit of analysis.[51] However, costs over a fixed period capture recurrences and, thus, may be the more practical approach from the perspective of payers and policy makers.

Our results were consistent with Carey et al[20] and a trial by Cherkin et al[21] in finding greater satisfaction with chiropractic care than with other interventions. We do not know how to value satisfaction against costs at this time but feel that satisfaction is an outcome that merits consideration in cost-effectiveness studies.

The RAND[19] study provides an example of cost-minimization analysis, a method that is,[31] "appropriate if the alternatives have identical consequences" including "side effects and adverse events." Despite these caveats, cost minimization has been the dominant methodology used in US cost analyses. In a subsequent example, patients with back and neck pain treated by chiropractors in one health maintenance organization had lower costs than those treated by other providers.[16] The authors recognized that they did not control for differences in comorbidities, chronic illnesses, or severity but only inferred from other data that there were no substantial differences in underlying illnesses.

A more widely cited study applied an incremental spending methodology to a large database of fee-for-service patients with LBP.[17,18] Chiropractic users had far lower outpatient and total costs for their episodes of care than nonusers. Although the analysis included controls for differences in patients' insurance and sociodemographic characteristics, controls for the severity of the condition and health status of the patient were limited. The study also did not include any patient outcomes measures. In the large managed care network study in California, where members with chiropractic coverage showed lower annual health care expenditures and lower use rates per episode of back pain than those without chiropractic coverage,[24] there were no patient outcomes measures that could lead to stronger evidence of chiropractic's relative cost-effectiveness. Our contribution examined both costs and outcomes to report results through easily understood incremental cost-effectiveness ratios.

Nevertheless, several limitations may have affected the study outcomes and generalization of findings. It is well-known that observational studies are more susceptible to bias than randomized controlled trials from unknown factors associated with patients and providers. Control for relevant confounding variables would have the greatest validity in inferring that the costs and outcomes are not attributable to other extraneous factors in observational studies.[32,33] Our study statistically controls for a broad set of potentially confounding variables to evaluate cost and effectiveness in actual practice when patients can select the providers of their choice. A well-designed observational study can thus overcome a major weakness of randomized trials, their artificial design and limited generalization to clinical practice.[52] Only large, pragmatic, randomized trials that do not control patient management can yield more accurate estimates of adjusted cost and outcomes differences between medical and chiropractic care.

Hospitalization/surgical costs were not available for our analysis. Because there was a greater referral rate for surgical evaluation from MDs and the hospitalization rate is known to be higher for medical patients,[19] it is likely that inclusion of hospitalization/surgery would have increased medical costs disproportionately.

Over-the-counter (OTC) drug costs were also excluded from the analysis. We found OTC drug costs difficult to estimate, because the data collected did not account for the large variation in drug type and pill dosage. Drug costs appeared to be relatively small compared to provider costs, so bias was probably small. It is unknown whether there was differential consumption of OTCs between chiropractic and medical patients.

Caution must be taken in generalizing study findings from a regional study to national practice. Chiropractic scope of practice varies from state to state,[53] permitting different modalities for the treatment of LBP. For example, Oregon's scope of practice included physical modalities, whereas neighboring Washington's did not. Caution must also be used in light of the continual evolution in health care financing and reimbursement mechanisms. The study controlled for some differences in patients' insurance characteristics, and these results will be reported elsewhere. However, the study design, conceived in the early 1990s, did not anticipate the extent of the shift toward managed care or of other developments such as consumer-driven health plans.

Conclusions

This study supports the generalizability of systematic reviews of the efficacy of spinal manipulation for pain and functional disability to the effectiveness of chiropractic care in clinical practice. Our findings are consistent with the review findings that spinal manipulation–centered therapy is

as least as good as, and in some cases, better than other treatments of LBP.[8-10] Although randomized trials found an advantage for chiropractic care in costs, our study leaned toward comparability.

Chiropractic patients with chronic LBP showed an advantage over medical patients in pain, disability, and satisfaction outcomes without additional costs. Chronic pain and disability outcomes were clinically important in the short term and of lesser magnitude in the long term. Satisfaction with chiropractic care was considerably greater for both acute and chronic patients at both time points. Although the advantages in pain and disability were small for acute patients with LBP, it is important to consider that these gains can be obtained with, at most, small increased costs. With their mission to increase value and respond to patient preferences, health care organizations and policy makers need to reevaluate the appropriateness of chiropractic as a treatment option for LBP.

Practical Application

- Chiropractic care is relatively cost-effective compared with primary medical care for the treatment of chronic LBP, particularly in the short term.
- Chiropractic and medical care are comparable in cost and effectiveness for acute LBP.
- Healthcare organizations and policy makers should consider the appropriateness of chiropractic as a treatment option for LBP.

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Synopsis
Of
Cost Effectiveness Research

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Synopses of Chiropractic Cost Effectiveness Research

Sarnat, Richard; Winterstein, James. "Clinical and Cost Outcomes of an Integrative Medicine IPA." ***Journal of Manipulative and Physiological Therapeutics*** **2004; 27: 336-347**

In 1999, a large Chicago HMO began to utilize Doctors of Chiropractic (DCs) in a primary care provider role. The DCs focused on assessment and evaluation of risk factors and practiced non-pharmaceutical/non-surgical prevention. Insurance claims and patient surveys were analyzed to compare clinical outcomes, costs and member satisfaction with a normative control group. During the 4-year study, this integrative medical approach, emphasizing a variety of Complimentary and Alternative Medical (CAM) therapies, realized lower patient costs and improved clinical outcomes for patients. The patients who used DCs as their primary care providers had 43 percent decreases in hospital admissions, 52 percent reductions in pharmaceutical costs and 43 percent less outpatient surgeries and procedures.

Legorreta A, Metz D, Nelson C, Ray S, Chernicoff H, DiNubile N. "Comparative Analysis of Individuals With and Without Chiropractic Coverage." ***Archives of Internal Medicine*** **2004; 164: 1985-1992.**

A 4-year retrospective review of claims from 1.7 million health plan members analyzed the cost effects of having a chiropractic benefit in their HMO insurance plan. The data revealed that members with the chiropractic benefit had lower overall total annual health care costs. Back pain patients with chiropractic coverage also realized lower utilization of plain radiographs, low back surgery, hospitalizations and MRI's. Back pain episode-related costs were also 25 percent lower for those with chiropractic coverage ($289 vs. $399).

Metz D, Nelson C, LaBrot T, Pelletier K. "Chiropractic Care: Is It Substitution Care or Add-on Care in Corporate Medical Plans?" ***Journal of Occupational and Environmental Medicine*** **2004; 46: 847-855.**

In a 4-year study period, the claims of 8 million members insured by a managed health plan were evaluated to determine how patients utilize chiropractic treatment when they have a chiropractic benefit. They found that patients use chiropractic as a direct substitution for medical care, choosing chiropractic 34 percent of the time. Having a chiropractic benefit rider did not increase the number of patients seeking care for neuromusculoskeletal complaints.

UK BEAM Trial Team "United Kingdom Back Pain, Exercise and Manipulation Randomized Trial: Cost Effectiveness of Physical Treatments for Back Pain in Primary Care." ***British Medical Journal*** **doi:10.1136/bmj.3828.607859.ae (published Nov. 19, 2004).**

This study compared the benefits of spinal manipulation and exercise to "best care" in general practice for patients consulting for back pain. 1,287 patients were recruited, divided into treatment groups and followed for more than one year. Patients receiving manipulation and exercise had lower relative treatment costs and received more treatment benefits than those treated with general medical care. The authors believe that this study was able to show convincingly that manipulation alone and manipulation followed by exercise provided cost-effective additions to general practice.

Korthals-de Bos I, Hoving J, Van Tulder M, Van Molken R, Ader H, De Vet H, Koes B, Vondeling H, Bouter L. "Primary Care - Cost Effectiveness of Physiotherapy, Manual Therapy and General Practitioner Care for Neck pain: Economic Evaluation Alongside a Randomized Controlled Trial." ***British Medical Journal*** **2003; 326: 911.**

Patients who saw general practitioners for neck pain were randomly allocated to manual therapy (spinal mobilization), physiotherapy (mainly exercise) or general practitioner care (counseling, education and drugs). Throughout this 52-week study, patients rated their perceived recovery, intensity of pain and functional disability. Manual therapy proved to be the most effective treatment for neck pain. The clinical outcome measures showed that manual therapy resulted in faster recovery than physiotherapy and general practitioner care. While achieving this superior outcome, the total costs of the manual therapy-treated patients were about one third of the costs of physiotherapy or general practitioner care.

Pelletier K, Astin J. "Integration and Reimbursement of Complementary and Alternative Medicine by Managed Care and Insurance Providers: 2000 Update and Cohort Analysis." ***Alternative Therapies in Health and Medicine*** **2002; 8(1): 38-48.**

Consumer demand for complementary and alternative medicine (CAM) is motivation for more managed care organizations (MCO's) and insurance companies to assess the clinical and cost benefits of incorporating CAM. Providers identified "consumer demand" as the most critical factor underlying their decision to offer CAM coverage. Companies surveyed in the present study tended to rate "retaining existing enrollees" as being more important than in previous years. It is equally certain that there is a rapidly growing consumer demand for CAM. Market demand is one of the primary motivators for offering coverage of CAM, with consumer interest similarly cited as a key factor. Emphasis on what is validated by sound clinical and cost outcomes research rather than what is considered "alternative" versus "conventional" will be critical for reducing excessive medical utilization and containing rising medical care costs.

"Utilization, Cost, and Effects of Chiropractic Care on Medicare Program Costs." Muse and Associates. American Chiropractic Association 2001.

This study examines cost, utilization and effects of chiropractic services on Medicare costs. The study compared program payments and service utilization for Medicare beneficiaries who visited DCs and those who visited other types of physicians. The results indicated that chiropractic care could reduce Medicare costs. Medicare beneficiaries who had chiropractic care had an average Medicare payment of $4,426 for all Medicare services. Those who had other types of care had an average of $8,103 Medicare payment for all Medicare services. The per claim average payment was also lower with chiropractic patients, having an average of $133 per claim compared to $210 per claim for individuals who did not have chiropractic care.

Pran, Manga. "Economic Case for the Integration of Chiropractic Services into the Health Care System." *Journal of Manipulative and Physiological Therapeutics* 2000; 23: 118-22.

This paper, written by Ontario Health Economist Pran Manga, PhD, makes the case that chiropractic is a safe, cost-effective treatment alternative. If further integrated into the health care system, he predicts reduced costs and improved outcomes. He points to the extensive body of literature which demonstrates that chiropractic is effective for neuromusculoskeletal disorders and the repeated evidence that patients often prefer chiropractic care over a medical approach. Evidence of effectiveness for medical care is not nearly as convincing for management of neuromusculoskeletal conditions.

Branson, Richard. "Cost Comparison of Chiropractic and Medical Treatment of Common Musculoskeletal Disorders: A Review of the Literature after 1980." *Topics in Clinical Chiropractic* 1999; 6(2): 57-68.

A cost comparisons study between DC-provided care and care provided by general and specialist MDs for individuals with musculoskeletal conditions found that the majority of retrospective studies had positive results for chiropractic care.

Manga, Pran. "Enhanced chiropractic coverage under OHIP (Ontario Health Insurance Plan) as a means for reducing health care costs, attaining better health outcomes and achieving equitable access to health services." *Report to the Ontario Ministry of Health,* 1998.

This study demonstrates the ways in which individuals in Ontario are deterred from the use of chiropractic care because it is not covered under OHIP. Greater chiropractic coverage under OHIP would result in a greater number of individuals visiting chiropractors and going more often. The study shows that despite increased visits to DCs, this would result in net savings in both direct and indirect costs. It is very costly to manage neuromusculoskeletal disorders using traditional medicine. If individuals were able to visit chiropractors under OHIP a great amount of money would be saved by the government. Direct savings for Ontario's healthcare system could be as much as $770 million and at the very least $380 million.

Smith, M; Stano, M. "Costs and Recurrences of Chiropractic and Medical Episodes of Low Back Care." *Journal of Manipulative and Physiological Therapeutics* 1997; 20(1): 5-12.

This study compared the health insurance payments and patient utilization patterns of individuals suffering from recurring low back pain visiting doctors of chiropractic to those visiting medical doctors. Insurance payments were higher for medically initiated episodes. Those who visited chiropractors paid a lower cost and were also more satisfied

with the care given. Because of this, the study suggests that chiropractic care should be given careful attention by employers when using gate-keeper strategies.

Stano M, Smith M "Chiropractic and Medical Costs of Low Back Care." *Medical Care* 1996; 34(3): 191-204.

This study compares health insurance payments and patient utilization patterns for episodes of care for common lumbar and low back conditions treated by chiropractic and medical providers. Using 2 years of insurance claims data, this study examines 6,183 patients who had episodes with medical or chiropractic first-contact providers. Multiple regression analysis, to control for differences in patient, clinical, and insurance characteristics, indicates that total insurance payments were substantially greater for episodes with a medical first-contact provider. The mean total payment when DCs were the first providers was $518, whereas the mean payment for cases in which an MD was the first provider was $1,020.

Stano, Miron. "The Economic Role of Chiropractic Further Analysis of Relative Insurance Costs for Low Back Care." *Journal of the Neuromusculoskeletal System* 1995; 3(3): 139-144.

This retrospective study of 7077 patients compared costs of care for treatment of common low back conditions when a chiropractor was the first provider versus when an MD was the first provider. Total payments for inpatient procedures were higher for MD initiated treatment and especially episodes that lasted longer than a single day. Outpatient payments were much higher for MD initiated treatments as well. Payments were nearly twice as great for the medically initiated cases and their outpatient payments were nearly 50% higher. Their statistical estimates indicate that the costs of care for common low back disorders using a chiropractor as first-contact provider are substantially lower than episodes in which a medical physician is the first- contact provider. The author concluded that "when our results are considered together with the recognition by the Agency for Health Care Policy and Research of the clinical efficacy of chiropractic for low back problems, it is clear that chiropractic deserves careful consideration in the strategies adopted by employers and third-party payers to control health care spending".

Stano, Miron. "A Comparison of Health Care Costs for Chiropractic and Medical patients." *Journal of Manipulative and Physiological Therapeutics* 1993; 16(5): 291-299.

Comparison of cost for patients who received chiropractic care for neuromusculoskeletal problems to those who received medical and osteopathic care. One quarter of patients analyzed were treated by chiropractors. These patients had lower health care costs. "Total cost differences on the order of $1000 over the two year period were found in the total sample of patients as well as in sub-samples of patients with specific disorders." Lower costs are attributed to lower inpatient utilization.

Manga, Pran; Angus, Doug; Papadopoulos, Costa; Swan, William. "The Effectiveness and Cost-Effectiveness of Chiropractic Management of Low-Back Pain." Richmond Hill, Ontario: Kenilworth Publishing, 1993.

This study reveals that if management of low back pain was shifted to chiropractors there could be a potential savings of millions of dollars every year. The study also revealed that spinal manipulation is both safe and more effective than drugs, bed rest, analgesics, and general practice medical care for managing low back pain.

Dean, David; Schmidt, Robert. "A comparison of the cost of chiropractors versus Alternative Medical Practitioners." Richmond, VA: Virginia Chiropractic Association, 1992.

This study is an assessment of the difference in cost of treatment between chiropractors and other practitioners in dealing with individuals who have similar back-related problems. This study analyzed individuals who had medical visits in 1980 and had a combination of eleven health problems including arthritis, disc disorders, bursitis, low back pain, spinal related sprains, strains and dislocations. Chiropractic care had a lower cost option for many back ailments.

State Specific Workers Compensation Studies

"Chiropractic Treatment of Workers' Compensation Claimants in the State of Texas." Executive Summary. MGT of America Feb 2003.

This retrospective study of workers' compensation claims from 1996 to 2001 was conducted to determine the use and efficacy of chiropractic care in Texas. The researchers reviewed 900,000 claims during that time period to determine if chiropractic was cost-effective compared to medical treatment. They found that chiropractor treatment costs were the lowest of all providers. Their data clearly demonstrated that increased utilization of chiropractic care would lead to declining costs relative to lower back injuries.

Folsom BL, Holloway RW "Chiropractic care of Florida workers' compensation claimants: Access, costs, and administrative outcome trends from 1994 to 1999." *Topics in Clinical Chiropractic* 2002; 9(4): 33-53.

This retrospective study of Florida workers' compensation claims from 1994-1999 found that the average total cost for low-back cases treated medically was $16,998 while chiropractic care was only $7,309. Patients treated primarily by chiropractors were found to reach maximum medical improvement almost 28 days sooner that if treated medically. Findings from this analysis of the Florida Claims and medical files indicate that considerable cost savings and more efficient claims resolution may be possible with greater involvement of chiropractic treatment in specific low back cases and other specific musculoskeletal cases.

Jarvis KB, Phillips RB, Danielson C. "Managed Care Pre-approval and its Effect on the Cost of Utah Worker Compensation Claims." *Journal of Manipulative and Physiological Therapeutics* 1997; 20(6): 372-376.

5000 claims from 1986 and 5000 from 1989 were examined for injured individuals in the Utah Worker Compensation Fund. The study compared cost for those who received chiropractic care and those who received medical care. From 1986 to 1989 the cost of care for chiropractic increased 12% while medical care increased 71%. The replacement of wages increased 21% for those receiving chiropractic care and 114% for those receiving medical care.

Tuchin PJ, Bonello R. "Preliminary Findings of Analysis of Chiropractic Utilization in the Workers' Compensation System of New South Wales, Australia." *Journal of Manipulative and Physiological Therapeutics* 1995; 18(8): 503-511.

In this study researchers analyzed WorkCover Authority data from New South Wales. Of 1289 cases reviewed 30% had back problems. 12% employed chiropractic care for spinal injury workers' compensation claims. The total payments for all cases using chiropractic and physiotherapy care were $25.2 million, which was 2.4% of the total payments. When 20 claims were chosen at random the average chiropractic cost of care was $299.65, while the average medical cost was $647.20. A trend in data collected indicated that when greater than 60% of total cost of treatment came from chiropractic care the number of days missed from work was 9.5. When less than 60% of total cost of treatment came from chiropractic care the number of days missed from work was 50.3.

Ebrall PS. "Mechanical Low Back Pain: A Comparison of Medical and Chiropractic Management within the Victorian Workcare Scheme." *Chiropractic Journal of Australia* 1992; 22(2): 47-53.

This study reviewed claims made in a twelve-month period involving work related mechanical low-back pain. Management by chiropractic care and medical care were compared. 39% of claims reviewed for individuals visiting chiropractors required compensation days while 78% of claims for those visiting medical doctors required compensation days. The average number of compensation days needed for those visiting chiropractors was 6.26 days and 25.56 days for those visiting medical practitioners.

Jarvis KB, Phillips RB, Morris EK "Cost Per Case Comparison of Back Injury Claims of Chiropractic Versus Medical Management for Conditions With Identical Diagnostic Codes" *Journal of Occupational Medicine* 1991; 33(8): 847-852.

This workers' compensation study conducted in Utah compared the cost of chiropractic care to the costs of medical care for conditions with identical diagnostic codes. The study indicated that costs were significantly higher for medical claims than for chiropractic claims. The sample consisted of 3062 claims or 40.6% of the 7551 estimated back injury claims from the 1986 Workers' Compensation Fund of Utah. For the total data set, cost for care was significantly more for medical claims, and compensation costs were 10-fold less for chiropractic claims.

Nyiendo, Joanne. “Disabling Low Back Oregon Workers' Compensation Claims. Part II: Time Loss.” *Journal of Manipulative and Physiological Therapeutics* 1991; 14(4): 231-239.

This report focused on time lost for individuals who visited DCs versus those who visited MDs for treatment of low back pain. Median missed days of work for individuals with similar severity of injury was 9.0 days for those visiting DCs and 11.5 for individuals visiting MDs. Individuals visiting chiropractors more often returned to work having missed one week or less of work days. There was no difference in time lost for individuals visiting DCs and MDs with no previous history of low back pain. For claimants with a history of chronic low back problems, the median time loss days for MD cases was 34.5 days, compared to 9 days for DC cases. It is suggested that chiropractors are better able to manage injured workers with a history of chronic low back problems and to return them more quickly to productive employment.

Nyiendo, Joanne, Lamm, Lester. "Disabling Low Back Oregon Workers' Compensation Claims. Part I: Methodology and Clinical Categorization of Chiropractic and Medical Cases." *Journal of Manipulative and Physiological Therapeutics* 1991; 14(3): 177-184.

This study examined 201 randomly selected workers' compensation cases that involved low back injuries that were disabling. The study found individuals who visited DCs less often initially had more trips to the hospital for their injuries than those visiting MDs.

Johnson MR, Schultz MK, Ferguson AC. "A Comparison of Chiropractic, Medical and Osteopathic Care for Work-Related Sprains/Strains." *Journal of Manipulative and Physiological Therapeutics* 1989; 12(5): 335-344.

This study analyzed data on Iowa state record from individuals in Iowa who filed claims for back or neck injuries in 1984. The study compared benefits and the cost of care received by individuals from MDs, DCs and DOs. There was a focus on individuals who missed days of work and were compensated because of their injuries. Individuals who visited DCs missed on average at least 2.3 days less than individuals who visited MDs and 3.8 days less than individuals who saw DOs. Less money was dispersed as employment compensation on average for individuals who visited DCs. On average, the disability compensation paid to workers for those who visited DCs was $263.66, $617.85 for those who visited MDs, and was $1565.05 for those who visited DOs.

Wolk, Steve. "An Analysis of Florida Workers' Compensation Medical Claims for Back-Related Injuries." *Journal of the American Chiropractic Association* 1988; 27(7): 50-59.

This study is an analysis of worker's compensation claims in Florida from June through December of 1987. All of the claims analyzed were related to back injuries. The greater purpose of this study was to compare the cost of osteopathic, medical and chiropractic doctors. The cost of drugs was not included in the analysis. The results of the study lead to the finding that individuals who had compensable injuries and were treated by chiropractors often times were not forced to be hospitalized. It also revealed that chiropractic care is a "relatively cost-effective approach to the management of work-related injuries."

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