Effect of Risk Adjustment Method on Comparisons of Health Care Utilization Between Complementary and Alternative Medicine Users and Nonusers

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Abstract

Objectives: Complementary and alternative medicine (CAM) providers are becoming more integrated into the United States health care system. Because patients self-select CAM use, risk adjustment is needed to make the groups more comparable when analyzing utilization. This study examined how the choice of risk adjustment method affects assessment of CAM use on overall health care utilization.

Design and subjects: Insurance claims data for 2000–2003 from Washington State, which mandates coverage of CAM providers, were analyzed. Three (3) risk adjustment methods were compared in patients with musculoskeletal conditions: Adjusted Clinical Groups (ACG), Diagnostic Cost Groups (DCG), and the Charlson Index. Relative Value Units (RVUs) were used as a proxy for expenditures. Two (2) sets of median regression models were created: prospective, which used risk adjustments from the previous year to predict RVU in the subsequent year, and concurrent, which used risk adjustment measures to predict RVU in the same year.

Results: The sample included 92,474 claimants. Prospective models showed little difference in the effect of CAM use on RVU among the three risk adjustment methods, and all models had low predictive power ($R^2 \leq 0.05$). In the concurrent models, coefficients were similar in direction and magnitude for all risk adjustment methods, but in some models the predicted effect of CAM use on RVU differed by as much as double between methods. Results of DCG and ACG models were similar and were stronger than Charlson models.

Conclusions: Choice of risk adjustment method may have a modest effect on the outcome of interest.

Introduction

COMPLEMENTARY AND ALTERNATIVE MEDICINE (CAM) providers are becoming more integrated into the United States health care system.^{1,2} Evaluating the cost of CAM care is important in light of the continually increasing cost of health care in the United States, and large administrative datasets are often analyzed to compare the resources consumed by patients who see CAM providers and those who do not. Because patients self-select as CAM users and nonusers, risk adjustment is used to reduce bias due to differences in health status between the groups and produce meaningful comparisons. In earlier work, it was found that the inclusion of diagnoses from CAM providers into a risk-adjustment index affected the assignment of patients into risk levels.³ This is

not surprising, in that claims from CAM providers have not been routinely included in the development of these indices, and coding patterns of CAM providers may differ from those of conventional providers.

An important unaddressed question is whether different risk-adjustment methods lead to different conclusions regarding the relative health care expenditures of patients treated by CAM providers compared to similar patients who are not. Previous researchers have reported that different adjustment methods led to different assessments of mortality risk,^{4–8} and differences in predicted utilization⁹ and expenditures.¹⁰ Furthermore, the performance of a given risk-adjustment method differed based on the outcome being predicted (cost versus mortality),¹¹ or specialty population being studied.¹¹

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This article compares the relative performance of three risk adjustment methods in predicting concurrent and future health care utilization levels of insured patients who receive some care from CAM providers and those who receive care only from conventional providers. The purpose of this analysis was to determine whether the method of risk adjustment influenced the estimated effect of CAM provider use on health care utilization.

Materials and Methods

Source of data and creation of dataset

This research was approved by the institutional review boards of the cooperating institutions. The study sample was constructed using calendar year 2000–2003 enrollment and claims data from three benefits coverage providers in Washington State that offer a variety of product types and provide health insurance coverage throughout the state. Beginning in 1996, Washington State law has required that private insurance companies provide coverage for all types of licensed health care practitioners within their licensed scope of practice, including CAM providers.¹² The analyses were restricted to insured individuals subject to the law requiring coverage of CAM providers, resulting in the exclusion of enrollees and their dependents funded through Medicare, Medicaid, or other exempted programs. The data acquisition process, data cleaning, and the creation of analytic variables have been previously described.¹³ The analyses presented here were limited to adults aged 18–64 years who had continuous coverage for the 12-month periods both before and after the visit that contained a new diagnosis for one of the musculoskeletal conditions of interest defined below.

Musculoskeletal conditions

All individuals included in the analyses had at least one visit for either a spine-related condition or a musculoskeletal condition not related to spine. Collectively these patients are referred to as having any musculoskeletal condition. Two (2) subsets of spine-related conditions were also analyzed: lower back pain and neck pain. All conditions were defined based on ICD9 codes included in the claims data. (See the Appendix for the diagnostic codes included in each of the categories.)

Time frame

Two (2) time periods of interest were created. The “study year” for each patient started on the day of the first visit for a qualifying musculoskeletal condition and continued for 365 days; the “prior year” for each patient was defined as the 365 days preceding the first visit for the musculoskeletal condition. Patients included in the analysis had no provider visits with a musculoskeletal diagnosis during the prior year. Individuals were excluded from the analysis if they were pregnant, had cancer, or had a musculoskeletal condition due to fracture or accident during the 24-month study period. (See Appendix for definitions.)

Provider types and users

CAM providers were defined as chiropractors, licensed massage therapists, acupuncturists, and naturopathic phy-

sicians. Conventional providers were defined as physicians (including osteopaths and specialists), advanced registered nurse practitioners, and physician assistants. CAM users were defined as patients with at least one visit to a CAM provider in the study year. Most also had at least one visit to a conventional provider. CAM nonusers were those with no visits to a CAM provider for any reason in the study year and at least one visit to a conventional provider for the index condition during the study year. CAM use in the year prior to the musculoskeletal diagnosis was not considered in defining CAM use groups.

Dependent variable

Relative Value Units (RVUs) were used as a proxy for expenditures because the agreements regarding use of claims data for this project precluded publication of actual dollar amounts. RVUs are non-dollar units that measure the relative expenditures associated with various medical services. The RVUs for outpatient services were calculated based on a provider fee schedule for a given procedure, the number of times the procedure was performed, the type of provider performing the procedure, and the type of facility in which the procedure was performed. RVUs for inpatient services were based on the diagnosis-related group codes listed in the claims record. RVUs were summed for each patient for the prior year and for the study year, both overall and by provider/service type (i.e., conventional or CAM provider).

Independent variables

The available claims data included patient age, gender, and type of insurance product (Fee for Service [FFS], Preferred Provider Organization [PPO], Point of Service [POS], Health Maintenance Organization [HMO]). County population was calculated based on 2000 census data and was then categorized as <100,000; 100,000–400,000; and >400,000. Visit-specific information included ICD-9 diagnosis codes, dates and types of visits, and provider type.

Risk adjustment methods

Adjusted clinical groups. Weiner et al. described the development of adjusted clinical groups (ACGs).¹⁴ In brief, this method creates an index in which ICD-9 diagnosis codes are categorized into 93 mutually exclusive groups that have similar medical use patterns and thus similar expected expenditures. The 93 groups in the ACG index can be collapsed into five Resource Utilization Bands (RUBs), ranging from lowest expected resource use to highest. In addition, the ACG software creates Expanded Diagnostic Clusters (EDCs), which group ICD9 codes into 26 clinically related sets such as Allergy, Cardiovascular, and Skin. In this analysis, models using the ACG adjustment method used indicator variables for RUB and for each of the EDC variables, because this adjusted for clinical differences as well as differences in expected resource use. Version 8.2 of the ACG software was used to generate these risk-adjustment values.¹⁵

Diagnostic cost groups. Ellis has described the Diagnostic cost groups (DCG) index.¹⁶ This index was originally created to predict inpatient costs among Medicare patients but now includes both inpatient and outpatient diagnoses

and provides separate models for predicting Medicare and non-Medicare patients. The software also includes separate algorithms for concurrent and prospective utilization models. This index creates clinically homogeneous groups of ICD-9 codes, which are then ranked by severity and finally combined into 25 ordered categories expected to have similar future expenditures. For the regression analyses, due to sparse cells the categories <0.5 were collapsed into one category, and the categories >25 were collapsed into one category, giving a total of 15 categories. In Table 1 describing the sample, DCGs are shown as Aggregated DCGs (ADCG),

which have fewer categories and were easier to display. Version 3.0 of the DCG software was used to generate these risk-adjustment values.¹⁷

Charlson index. Charlson and colleagues developed a method to be applied prospectively to classify patients' mortality risk on the basis of comorbid conditions.¹⁸ Deyo et al. adapted the Charlson index to be used with ICD-9 diagnostic codes.¹⁹ Quan later published an enhanced comorbidity index that included newer ICD-9 codes.²⁰ Both the Deyo and Quan adaptations code for 17 comorbidity

TABLE 1. DESCRIPTION OF ANALYZED PATIENTS BY COMPLEMENTARY AND ALTERNATIVE MEDICINE USE DURING THE STUDY YEAR

Variable	CAM nonusers		CAM users	
	n 78,033	% 84.4	n 14,441	% 15.6
Gender*				
Female	42,253	54.1	8408	58.2
Male	35,780	45.9	6033	41.8
County population*				
<100,000	4835	6.2	1344	9.3
100,000–399,999	15,209	19.5	4273	29.6
400,000+	57,989	74.3	8824	61.1
Insurance company				
A	2254	2.9	632	4.4
B	26,965	34.6	4746	32.9
C	48,814	62.6	9063	62.8
Insurance product*				
Traditional Fee for Service (FFS)	2063	2.6	526	3.6
Preferred Provider Organization (PPO)	13,945	17.9	2820	19.5
Point of Service (POS)	21,877	28.0	4247	29.4
Health Maintenance Organization (HMO)	39,122	50.1	6661	46.1
Multiple	1026	1.3	187	1.3
Age: mean (SD)	45.9	(11.6)	45.2	(10.8)
Relative Value Units: Mean (SD)*	36.5	(76.5)	43.8	(65.1)
Median (IQR)	19.4	(9–40)	27.5	(14–52)
Health conditions				
Spine*	24,437	31.3%	7330	50.8%
Musculoskeletal–not spine*	53,596	68.7	7111	49.2
Neck pain*	5091	6.5	2014	14.0
Lower back pain*	15,594	20.0	6171	42.7
Post ACG, measured as RUB ^{a*}				
Lowest predicted utilization 1	3446	4.4	110	0.8
2	13,035	16.7	1639	11.4
3	50,483	64.7	9833	68.1
4	9043	11.6	2318	16.1
Highest predicted utilization 5	2026	2.6	541	3.7
Post DCG, measured as ADCG ^{a*}				
Predicted expenditure <\$1000	5217	6.7	721	5.0
Predicted expenditure \$1000–\$4999	40,683	52.1	7452	51.6
Predicted expenditure \$5000–\$9999	19,719	25.3	3816	26.4
Predicted expenditure \$10,000–\$24,999	10,478	13.4	2133	14.8
Predicted expenditure >\$25,000	1936	2.5	319	2.2
Post Charlson ^{a*}				
0	68,653	88.0	12,787	88.6
1	7480	9.6	1394	9.6
2+	1900	2.4	260	1.8

* $p < 0.001$.

^aRisk adjustment methods: ACG=Adjusted Clinical Groups, shown here as Resource Utilization Bands (RUB). DCG=Diagnostic Cost Groups, shown here as Aggregated DCGs (ADCGs). Charlson: Number of comorbid conditions included in the Charlson index, coded as none, 1, and 2 or more. See text for complete explanation.

CAM, complementary and alternative medicine; SD, standard deviation; IQR, interquartile range.

conditions that are each assigned a weight that reflects the seriousness of the condition. For this analysis, Quan's adaptation of Charlson risk scores was calculated and then the scores were categorized as 0 (no comorbidity risk), 1 (weighted comorbidity risk of 1), and 2 (a weighted comorbidity risk of 2 or greater).

Statistical analysis. Independent-samples *t*-tests were used for unadjusted comparisons of mean age and mean RVUs between CAM users and nonusers. Chi-square tests were used to compare distributions of gender, risk strata, county population, and insurance companies between CAM users and nonusers.

Percentile regression analysis was used to perform comparisons of median RVUs between CAM users and nonusers after adjustment for age, gender, and insurance company. Median regression was chosen because it gives a better model of "average" resource use, given the skewed nature of utilization data. County population and type of insurance product were also investigated as potential adjustment variables, but they were not significant and thus were dropped from subsequent models. Two (2) sets of models predicting medians were developed. One (1) set used risk-adjustment variables from the year prior to the onset of the musculoskeletal condition to predict RVUs in the subsequent study year ("prospective models"), and the other set used risk-adjustment variables from the study year to predict RVUs during the same year ("concurrent models"). Models were constructed for all patients with musculoskeletal diagnoses and then separately for those within each subcategory. All of these models yielded consistent results, so only the results for all patients with musculoskeletal diagnoses are presented in the tables.

A final set of prospective and concurrent linear regression models was fit to predict patients in the highest decile and to predict those in the lowest decile of total RVU, to see if different risk-adjustment methods performed differently in groups in the high and low tails of the utilization distribution.

Stata version 10 (College Station, TX: StataCorp LP) was used for all analyses.²¹

Results

The sample characteristics are shown in Table 1. The sample included 92,474 claimants, of whom 14,441 (15.6%)

had at least one visit to a CAM provider. Women made up 54.8% ($n=50,661$) of the entire sample and were more likely to be CAM users than men (16.6% versus 14.4%, $p<0.001$). Those who lived in less populated counties were also more likely to be CAM users than those who lived in more urban counties, and those with FFS insurance plans were more likely to be CAM users than those with other types of insurance plans. Mean age was similar between the two groups. Unadjusted mean RVU was significantly higher among CAM users than nonusers (43.8 versus 36.5, $p<0.001$).

All claimants had one or more musculoskeletal conditions, by definition. Diagnoses related to spine were present in 34.8% of all claimants, and in 50.8% of those with least one visit to a CAM provider. Similarly, diagnoses related to neck pain and lower back pain were more prevalent among CAM users than nonusers, but musculoskeletal diagnoses not related to spine were more prevalent among non-CAM users.

Distributions among risk categories also differed between CAM users and nonusers. Although all differences were significant due to the large sample size, the distributions of CAM users and nonusers across risk categories were similar for the DCG and Charlson risk adjustment methods. For the ACG risk adjustment method using RUBs, a smaller proportion of CAM users fell into the lowest two risk categories compared to nonusers (12.2% versus 21.1%).

Median regression results

Prospective models. None of these models strongly predicted RVUs. Maximal R^2 values were in the range of 0.03–0.06, and all risk adjustment methods gave similar results. The Charlson method yielded a statistically significantly higher β related to CAM use than the other methods (as indicated by a nonoverlapping 95% confidence interval), but the difference in RVU of 1.3 (compared to the β in the DCG model) does not appear to be of clinical interest (Table 2).

Concurrent models. These models had higher R^2 values of around 0.2 using either the DCG or ACG risk-adjustment method (Table 3). Adjustment using the Charlson method produced R^2 values of 0.05. In addition, differences in the role of CAM use were seen among the three risk-adjustment models. The effect of CAM use was nearly twice as large using the Charlson method (coefficient of 8.0) compared to

TABLE 2. PROSPECTIVE MEDIAN REGRESSION MODELS: COMPARISON OF RISK ADJUSTMENT METHODS USING DATA FROM THE PRIOR YEAR TO PREDICT THE EFFECT OF COMPLEMENTARY AND ALTERNATIVE MEDICINE USE ON TOTAL RELATIVE VALUE UNITS IN THE STUDY YEAR

Model	Coefficient ^a	SE	<i>t</i>	<i>p</i> -Value	95% CI		R^2
Unadjusted	8.06	0.20	40.79	<0.001	7.68	8.45	0.005
Demographics ^b only	7.93	0.23	34.19	<0.001	7.47	8.38	0.026
Dem. + Charlson ^c	8.26	0.20	40.4	<0.001	7.86	8.67	0.028
Dem. + DCG ^d	6.95	0.17	39.84	<0.001	6.61	7.30	0.064
Dem + ACG ^e	7.13	0.17	40.97	<0.001	6.79	7.47	0.063

^aCoefficient for CAM use compared to no CAM use.

^bDemographics=age, gender, and insurance company.

^cCharlson risk index as 2 indicators (1, 2 or more) compared to 0 (reference category).

^dACG included as 26 indicators for Extended Diagnostic Categories and 4 categories for Resource Utilization Band (lowest predicted use as reference category). See text for definitions.

^eDCG included as 14 indicators compared to ≤ 0.5 (the reference category). See text for definitions.

SE, standard error; CI, confidence interval.

TABLE 3. CONCURRENT MEDIAN REGRESSION MODELS: COMPARISON OF RISK ADJUSTMENT METHODS BASED ON DATA FROM THE STUDY YEAR FOR PREDICTING THE EFFECT OF COMPLEMENTARY AND ALTERNATIVE MEDICINE USE ON TOTAL RELATIVE VALUE UNITS IN THE STUDY YEAR

Model	Coefficient ^a	SE	t	p-Value	95% CI		R ²
Unadjusted	8.06	0.20	40.79	<0.001	7.68	8.45	0.0053
Demographics ^b only	7.93	0.23	34.19	<0.001	7.47	8.38	0.026
Dem. + Charlson ^c	8.01	0.22	36.3	<0.001	7.58	8.44	0.0505
Dem. + DCG ^d	5.63	0.09	60.17	<0.001	5.45	5.82	0.2338
Dem + ACG ^e	4.57	0.08	59.67	<0.001	4.42	4.72	0.2226

^aCoefficient for CAM use compared to no CAM use.

^bDemographics=age, gender, and insurance company.

^cCharlson risk index as 2 indicators (1, 2, or more) compared to 0 (reference category).

^dACG included as 26 indicators for Extended Diagnostic Categories and 4 categories for Resource Utilization Band (lowest predicted use as reference category). See text for definitions.

^eDCG included as 14 indicators compared to ≤ 0.5 (the reference category). See text for definitions.

SE, standard error; CI, confidence interval.

the ACG method (coefficient 4.6). That is, in the Charlson model, CAM users are predicted to have RVUs about 40% higher than nonusers (based on the unadjusted median of 19 among nonusers) while in the ACG model, CAM users are predicted to have RVUs about 23% higher than nonusers.

High and low decile models. In the prospective models predicting the 90th percentile of RVU, all of the adjustment methods gave similar results (Table 4). However, the results were quite different in the concurrent models, where the Charlson coefficient was twice as large as the ACG coefficient. In these concurrent models, all three risk-adjustment methods gave significantly different results, as shown by the nonoverlapping confidence intervals. However, the difference in magnitude between the β s seen in the DCG and ACG models was small.

In the models predicting the 10th percentile of RVU, all of the models gave similar results, with lower R^2 values seen in the prospective models than in the concurrent models (Table 5).

Discussion

The purpose of this article was to analyze the effect of three different risk-adjustment methods on the estimations of differences in health care utilization between patients who

had musculoskeletal conditions and who used CAM providers and similar patients who did not. The purpose was not to compare health care utilization directly between CAM users and nonusers; this group has published the direct comparison previously.²²

In general, the three risk-adjustment methods gave consistent results in terms of direction and significance of findings, but in some models the magnitude of the CAM use effect was quite different between methods. For example, in the concurrent model including all claimants, based on the Charlson method, one would infer that CAM users are expected to have resource use about 40% higher than nonusers, but in the same model using ACGs for adjustment, CAM users were expected to have resource use about 23% higher than nonusers.

The ACG and DCG risk-adjustment methods produced similar β estimates and had similar R^2 values. The Charlson index had lower explanatory power and in some models produced a very different β estimate. This is not surprising because both the ACG and DCG indices were created to predict resource use (which was the dependent variable in these models), while the Charlson index was created to predict risk of mortality in inpatients. Nevertheless, the Charlson is often used to risk adjust for outcomes other than mortality because it is freely available and easy to implement.

TABLE 4. QUANTILE REGRESSIONS PREDICTING THE EFFECT OF COMPLEMENTARY AND ALTERNATIVE MEDICINE USE ON THE 90TH PERCENTILE OF RELATIVE VALUE UNITS: COMPARISON OF THREE RISK ADJUSTMENT METHODS

	Model	Coeff. ^a	SE	t	p>t	95% CI		R ²
Prospective Models	Unadjusted	16.42	1.29	12.72	<0.001	13.89	18.96	0.0032
	Demographics ^b only	14.61	1.01	14.51	<0.001	12.64	16.59	0.0257
	Dem. + Charlson ^c	15.14	1.06	14.32	<0.001	13.07	17.21	0.0397
	Dem. + DCG ^d	14.71	1.10	13.34	<0.001	12.55	16.87	0.0817
	Dem + ACG ^e	13.34	0.87	15.25	<0.001	11.63	15.06	0.0784
Concurrent Models	Dem. + Charlson ^c	16.10	0.87	18.49	<0.001	14.39	17.80	0.0884
	Dem. + DCG ^d	9.28	0.37	25.39	<0.001	8.56	9.99	0.3341
	Dem + ACG ^e	7.37	0.37	19.86	<0.001	6.64	8.10	0.2749

^aCoefficient for CAM use compared to no CAM use.

^bDemographics=age, gender, and insurance company.

^cCharlson risk index as 2 indicators (1, 2 or more) compared to 0 (reference category).

^dACG included as 26 indicators for Extended Diagnostic Categories and 4 categories for Resource Utilization Band (lowest predicted use as reference category). See text for definitions.

^eDCG included as 14 indicators compared to ≤ 0.5 (the reference category). See text for definitions.

Coeff., coefficient; SE, standard error; CI, confidence interval.

TABLE 5. QUANTILE REGRESSIONS PREDICTING THE EFFECT OF COMPLEMENTARY AND ALTERNATIVE MEDICINE USE ON THE 10TH PERCENTILE OF RELATIVE VALUE UNITS: COMPARISON OF THREE RISK ADJUSTMENT METHODS

	<i>Model</i>	<i>Coeff.^a</i>	<i>SE</i>	<i>t</i>	<i>p > t</i>	<i>95% CI</i>		<i>R²</i>
Prospective Models	Unadjusted	2.65	0.09	31.06	<0.001	2.49	2.82	0.0032
	Demographics ^b only	2.68	0.07	38.28	<0.001	2.54	2.82	0.0175
	Dem. + Charlson ^c	3.41	0.06	59.34	<0.001	3.30	3.52	0.0203
	Dem. + DCG ^d	3.04	0.07	43.22	<0.001	2.90	3.18	0.0346
Concurrent Models	Dem + ACG ^e	3.19	0.02	179.11	<0.001	3.15	3.22	0.0379
	Dem. + Charlson ^c	2.55	0.06	42.94	<0.001	2.44	2.67	0.0284
	Dem. + DCG ^d	2.28	0.06	37.28	<0.001	2.16	2.40	0.1313
	Dem + ACG ⁵	2.05	0.06	37.26	<0.001	1.94	2.16	0.1697

^aCoefficient for CAM use compared to no CAM use.

^bDemographics=age, gender, and insurance company.

^cCharlson risk index as 2 indicators (1, 2, or more) compared to 0 (reference category).

^dACG included as 26 indicators for Extended Diagnostic Categories and 4 categories for Resource Utilization Band (lowest predicted use as reference category). See text for definitions.

^eDCG included as 14 indicators compared to ≤0.5 (the reference category). See text for definitions.

SE, standard error; CI, confidence interval.

The use of RVUs rather than actual expenditures could be perceived as a limitation of the analysis. However, confirmatory analyses using actual expenditures found consistent results with the RVU results published here (data not shown). Furthermore, the purpose of this article was not to quantify a difference in expenditures between insured CAM users and nonusers; this has been published previously.²² Instead, the purpose was to see whether the choice of risk-adjustment method had an impact on the comparison of utilization between these groups. For this purpose, RVUs are a useful measure of utilization, and explanations of the percentage differences have been included in order to aid the reader in interpreting the magnitude of the findings.

Conclusions

Patients self-select into CAM using and nonusing groups, making it difficult to formulate valid comparisons between the groups. Risk adjustment is necessary to reduce any potential bias, but it is important for researchers to remember that no risk-adjustment method perfectly corrects for all differences between groups. The comparisons reported here found that results were consistent between methods but that the size of the effect associated with CAM use differed in some cases. The DCG and ACG methods performed better than the Charlson and are recommended for use. In addition, if possible, the use of multiple risk-adjustment methods is advisable in order to verify that observed findings are real and not artifacts of a particular method of risk adjustment.

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Disclosure Statement

No competing financial interests exist.

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Appendix: Condition Definition

Conditions are defined by or, in the case of Musculoskeletal Conditions, calculated from ICD9 codes.

Conditions of interest:

Musculoskeletal Conditions

The ACG software converts 1052 ICD9 codes (60 codes at the three-digit level) into the following Expanded Diagnostic Clusters (EDC), the presence of any EDC listed below is considered a musculoskeletal condition for this study.

MUS01 Musculoskeletal signs and symptoms

MUS02 Acute sprains and strains

MUS03 Degenerative joint disease

MUS05 Torticollis

MUS06 Kyphoscoliosis

MUS07 Congenital hip dislocation

MUS09 Joint disorders, trauma related

MUS11 Congenital anomalies of limbs, hands, and feet

MUS12 Acquired foot deformities

MUS13 Cervical pain syndromes

MUS14 Low back pain

MUS15 Bursitis, synovitis, tenosynovitis

MUS17 Musculoskeletal disorders, other

Spine Disorders

720.* Ankylosing spondylitis and other inflammatory spondylopathies

721.* Spondylosis and allied disorders

722.* Intervertebral disk disorders

723.* Other disorders of cervical region

724.* Other and unspecified disorders of back

737.* Curvature of spine

839.* Other, multiple, and ill-defined dislocations of spine

846.* Sprains and strains of sacroiliac region

847.* Sprains and strains of other and unspecified parts of back

Cervical Pain/Disorders

723.* Other Disorders of Cervical Region

721.0* Cervical Spondylosis Without Myelopathy

721.1* Cervical Spondylosis With Myelopathy

Low Back Pain

721.3 Lumbosacral Spondylosis Without Myelopathy

722.10 Displacement of Lumbar Intervertebral Disc Without Myelopathy

722.32 Schmorl's Nodes of Lumbar Region

722.52 Degeneration of Lumbar or Lumbosacral Intervertebral Disc

722.93 Other and Unspecified Disc Disorder of Lumbar Region

724.02 Spinal Stenosis of Lumbar Region

724.2 Lumbago

724.3 Sciatica

724.5 Backache, Unspecified

724.6 Disorders of Sacrum

724.7* Disorders of Coccyx

738.5 Other Acquired Deformity of Back or Spine

739.3 Nonallogenic Lesions of Lumbar Region, NEC

739.4 Nonallogenic Lesions of Sacral Region, NEC

846.* Sprains and Strains of Sacroiliac Region

847.2 Lumbar Sprain

Exclusion conditions defined by the following ICD9 codes when assigned by an MD, PA, ARNP, or DO:

Cancer (excludes benign neoplasms 210.* - 229.*)

140.* - 208.*

230.* - 239.*

Pregnancy

630.* - 676.*

Fractures

800.* - 829.*

Accidents

(Using this method can be defined by a three-digit ICD9 code)

800.* - 839.* Fractures and dislocations

850.* - 854.* Intracranial injury, excluding those with skull fracture

860.* - 869.* Internal injury of chest, abdomen, and pelvis

905.* - 909.* Late effects of injuries, poisonings, toxic effects, and other external causes

929.* Crushing injury of multiple and unspecified sites

952.* Spinal cord injury without evidence of spinal bone injury

958.* - 959.* Certain traumatic complications and unspecified injuries