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# The Association Between Low Back Pain Treatments and Health Outcomes: A Regional Analysis of the Military Health System (Journal Article)

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# The Association Between Low Back Pain Treatments and Health Outcomes: A Regional Analysis of the Military Health System

## ***Introduction***

Low back pain (LBP) is a common, potentially disabling condition with an estimated point prevalence of 12% and an estimated lifetime prevalence of 40% among the general US population.[1] In 2013, the estimated spending related to LBP and neck pain was $87.6 billion, representing an increase of $57.2 billion over the prior 18 years.[2] LBP is a particular concern for the Military Health System (MHS) and is a leading cause of medical separation from service for servicemembers.[3,4] From 2010 through 2014, LBP was associated with over six million outpatient visits and more than 25,000 hospitalizations among active service members;[5] many more active duty personnel might be seen informally and triaged back to training without any formal visits within the MHS.

The MHS provides health care to active duty and retired military personnel and their civilian dependents, either through a direct-care system of hospitals staffed and operated by military employees (either uniformed or civil service) or through a purchased-care system of civilian health care providers.[6] Studies have documented substantial geographic variation in care within the MHS, with important cost implications.[6,7] Large geographic variations in treatment are often associated with uncertainty regarding the best treatment option, as is the case with spine care.[8] Despite this uncertainty, numerous clinical practice guidelines for the treatment of low back pain, including one specifically from the Department of Veterans Affairs (VA) and Department of Defense (DOD), support focusing on nonpharmacologic management, promoting self-care, and reducing reliance on medication, particularly opioids.[9,10]

Little is known about the variability in patterns of care for LBP across the MHS. In this study, we use the Military Health System Data Repository (MDR), a centralized repository of data that includes direct-care encounter data as well as purchased-care claims, to characterize variations in care for LBP. Using these claims, we evaluate variations in utilization and outcomes among adult TRICARE beneficiaries with LBP. We hypothesize that similar patients are treated differently across TRICARE catchment areas. We further hypothesize that these treatment differences are associated with different timelines to recovery and/or different rates of progression to chronic back pain.

## ***Methods***

Data Source and Study Population

The cohort for this study comprised TRICARE Prime beneficiaries aged 19-64 years diagnosed with LBP from April 2015 through December 2018 (TRICARE Prime is the managed care option for military members and their families). Data for the analysis were extracted from the MDR, which also integrates MHS healthcare data worldwide and contains beneficiary, clinical, and administrative claims data. The administrative claims data include inpatient, outpatient, and pharmacy claims for both “direct care” provided by the military and “purchased care” provided by the private sector. Beneficiaries who were stationed overseas, eligible for Medicare, or had other health insurance were excluded. TRICARE Prime beneficiaries were assigned to catchment areas based upon the ZIP code of their current residence. We observed patients in 104 catchment areas across the United States.

Incident LBP diagnoses were identified in TRICARE administrative claims data using International Classification of Diseases Ninth Revision (ICD-9) prior to October 2015 and Tenth Revision (ICD-10) codes from October 2015 onwards. The onset of a spine problem with related LBP was defined as the first claim date with an LBP inclusion diagnosis (Online Appendix, Table A.1), provided that the 12-month period prior to that date was free from a documented

LBP inclusion diagnosis within the MDR. This process identified 291,950 beneficiaries with incident LBP.

Patients with a variety of concomitant “red flag” diagnoses, such as cancer and paralysis (Online Appendix, Table A.1) in the period from 3 months prior to the index date to 12 months following the index date, were excluded from the analysis (83,227 patients, 28.5%). These exclusions were meant to avoid any acute accidents, cancer, or neurologic conditions that may be linked to chronic pain. In addition, 42,482 patients (14.6%) were excluded who, within the three-month period prior to their index date, had previously received one or more LBP treatments (Online Appendix, Table A.2) or an opioid or benzodiazepine prescription for any indication. This exclusion aimed to ensure that only new LBP episodes were included in the study. Finally, an additional 7,461 patients (2.5%) residing in catchment areas with fewer than 500 LBP patients were excluded to minimize statistical noise in estimating catchment area treatment rates. After applying these exclusions, 159,027 LBP patients remained in the final analytic cohort, selected from 73 catchment areas.

Treatment Measures

Because this study examined how different regional providers used specific treatments, we aimed to avoid confounding by indication at the level of the individual. Consequently, we aggregated each measure to create adjusted treatment rates at the catchment-area level, with indirect adjustments for age, sex, and beneficiary status.[11] Current Procedural Terminology (CPT) codes and National Drug Codes (NDCs) were used to flag potential treatments applied during the 3-month period following the index LBP diagnosis, including physical therapy, manual therapy, behavioral therapies, opioid prescription, and benzodiazepine prescription (Appendix Table A.2).

To facilitate comparisons of odds ratios across treatment types, each adjusted treatment rate was divided by its standard deviation. Treatment types are not mutually exclusive, and some patients received multiple treatments during the first 3 months. Because the use of spine surgery (See Appendix A.2) in the first 3 months was just 0.3% of the cohort—and therefore statistically imprecise at the catchment level—we did not calculate catchment-level treatment rates for surgery.

Outcome Measures

The primary outcome measure is defined as an absence of administrative claims for LBP visits or admissions for 6 to 12 months following the LBP index diagnosis. The secondary outcome measure focuses on the same 6-12 month period but establishes a higher threshold for success—a flag indicating that the patient had *neither* a claim with an LBP diagnosis *nor* a claim with any of the following potential LBP treatments: physical therapy, manual therapy, behavioral therapies, an opioid prescription, a benzodiazepine prescription, or spine surgery.

Covariates

Baseline demographics for the index month were obtained from the TRICARE enrollment file; these data included age category, sex, beneficiary status (active, dependent, or retired/other), and catchment area. We included "other" enrollees with "retired" because on average they were of similar ages. For the purpose of risk adjustment, we included 11 specific LBP diagnoses during the index month as categorical variables (see Appendix Table A.1). An additional variable was included to identify beneficiaries with two or more different LBP diagnoses, as a potential marker of complexity or severity.

Statistical Analysis

Descriptive statistics were calculated for beneficiary baseline characteristics (including age, sex, beneficiary status, and index LBP diagnosis) and treatments (manual therapy, physical therapy, behavioral therapies, and opioid and benzodiazepine prescriptions). We also performed subgroup analysis by beneficiary type (active duty, dependent, or retired/other).

Separate multivariate logistic regression models were estimated using the individual-level outcome measures and individual and catchment-area covariates described above for the overall sample and for each of the three beneficiary types (odds ratios and 95% confidence intervals (C.I.) are reported). The logistic regression models clustered the standard errors on catchment area to account for within-area error clustering. As noted above, we considered catchment-area rates of treatment rather than individual treatment measures, as the likelihood of unobserved confounding is greater at the individual level (e.g., patients with more serious LBP will be more likely to receive one of the five treatments) than at the catchment-area level, where large cohort sizes tend to average out individual heterogeneity in severity. All models were estimated using SAS version 9.4.

We also considered sensitivity analyses in which treatment rates were included as indicator variables for catchment areas in the top and bottom quartile of treatment rates to capture the possibility of both undertreatment (if the coefficient for being in the bottom quartile is associated with worse outcomes) and overtreatment (if the coefficient for the top quartile is associated with worse outcomes). However, we did not find evidence for such inverse-U-shaped treatment effects, so these estimates are not reported.

## ***Results***

Table 1 shows the characteristics of our cohort. The modal age category was 45-54 (29%); 34% were active-duty service members; 51% were retired; and 15% were dependents. On average, across catchment areas, 56% were male, and the vast majority had non-specific LBP (72% backache/lumbago and 15% dorsalgia). Cases that included radiculopathy and/or sciatica accounted for about 10-15% of the cases. The average resolution rate for LBP was 79%, where resolution is defined as an absence of claims with LBP diagnosis 6-12 months after the index date. For the secondary definition of resolution (an absence of claims with LBP diagnosis or any physical therapy, manual therapy, behavioral therapies, an opioid prescription, a benzodiazepine prescription, or spine surgery 6-12 months after index date), there was a 61% rate of resolution. That is, nearly 20% of the identified index LBP cases continued to receive one or more of the treatment interventions mentioned above, although no ongoing LBP diagnosis was documented.

Figure 1 summarizes the treatments received across catchment areas. Physical therapy, manual therapy, and opioid prescription were the most commonly received treatments in the first 3 months, with substantial variation across catchment areas. Adjusted for age, sex, and beneficiary category, opioid prescribing rates ranged from 15% to 28%; rates of physical therapy ranged from 17% to 39%; and manual therapy ranged from 5% to 26%. Table 2 shows clinically important differences in treatment rates by beneficiary category, with rates of non-pharmacologic treatments (PT, manual therapy, and behavioral therapies) significantly higher in the active-duty cohort, and opioid and benzodiazepine prescription significantly lower in this cohort.

Table 3 summarizes the main results of the multivariate logistic regression models evaluating the association between catchment-area rates of the different treatments on resolution of LBP. Patients with no additional LBP diagnosis in the 6-12 months after the index event (Model 1) showed a negative and marginally significant association between a successful resolution of LBP and opioid prescriptions (odds ratio 0.97, 95% C.I. 0.93 to 1.00; p = 0.051) but with no significant association with physical therapy (odds ratio 0.98, 95% C.I., 0.94 to 1.03), manual therapy (odds ratio 1.01, 95% C.I., 0.97 to 1.05), benzodiazepine (odds ratio 1.01, 95% C.I., 0.97 to 1.04), and behavioral therapies (odds ratio 1.00, 95% C.I., 0.97 to 1.03).

When the outcome measure required both an absence of an LBP diagnosis and the absence of any ongoing treatment (Model 2), the results indicated a stronger negative association between back pain resolution and opioid prescribing (odds ratio 0.94, 95% C.I., 0.92 to 0.97), physical therapy (odds ratio 0.96, 95% C.I., 0.92 to 0.99), and behavioral therapies (odds ratio 0.94, 95% C.I., 0.93 to 0.98). Finally, the analysis was restricted to the subset of only active-duty personnel with the primary outcome of resolution based on absence of LBP diagnoses. Successful LBP resolution was negatively associated with opioid prescriptions (odds ratio 0.93, 95% C.I. 0.89 to 0.97) but with no significant association for physical therapy (odds ratio 0.95, 95% C.I., 0.90 to 1.01), manual therapy (odds ratio 1.03, 95% C.I., 0.97 to 1.08), benzodiazepine (odds ratio 0.98, 95% C.I., 0.92 to 1.04), and behavioral therapies (odds ratio 1.03, 95% C.I., 0.99 to 1.07).

## ***Discussion***

In this claims-based analysis of TRICARE Prime beneficiaries aged 19-64, we found substantial variation in the treatment of LBP across catchment areas. Physical therapy was, on average, the most commonly used treatment among those we were able to assess, with catchment area rates ranging from 17 – 39%. Opioid prescription was the next most commonly used treatment on average, with catchment area rates ranging from 15 – 28%; this treatment was associated with significantly worse outcomes. Behavioral therapies were rarely used and were also associated with lower rates of LBP resolution when the definition of LBP resolution included ongoing treatments in addition to only LBP diagnoses. Practice patterns for active-duty beneficiaries were somewhat more consistent with guideline recommendations, showing higher rates of non-pharmacologic interventions and lower rates of opioid and benzodiazepine prescription, but the catchment area rates of opioid prescription were still associated with worse outcomes in the model restricted to active-duty beneficiaries.

Our findings are consistent with prior studies looking at treatment of LBP among soldiers. Larson et al. evaluated treatment of LBP among soldiers from 2012 through 2014 and found early treatment patterns similar to ours, with 26% receiving exercise therapy, 14% “other physical therapy,” and 24% receiving opioids.[12] The researchers similarly found that early opioid use was associated with a higher likelihood of negative outcomes, which in their study included military duty limitation and emergency department visits.[12] While our outcome of resolution of any ongoing claims for LBP was not found to be positively associated with early receipt of non-pharmacologic therapy, Larson et al. did find that early non-pharmacologic treatment without opioids was associated with lower likelihood of military duty limitation and pain-related hospitalization.[12] The high rate of opioid prescription in our study is also consistent with findings by Schoenfeld et al., who found that among new sustained (>6 months continuous prescription) opioid users in TRICARE from 2006 through 2014, “lumbago” was the most common indication for initial opioid prescription at Military Medical Centers. Lumbago was the second most common indication behind “other ill-defined conditions” at Civilian Medical Centers.[13]

An important aspect of our analysis involves the use of treatment rates at the catchment-area level in our regression models and adjustments for diagnosis of the index visit. This approach avoids the problem of confounding by indication—the possibility that patients who receive opioids for their LBP are more severe at presentation and therefore would be expected to have worse outcomes—and accounts for systematic differences in the type of cases being seen across catchment areas. Because the analysis was based on claims, we do not have clinical details or patient-reported severity to completely control for potential differences between patients across specific locations, but our results using catchment-level rates to minimize confounding suggest an association of opioid treatment with worse outcomes. This result is consistent with randomized control trial data by Krebs et al., showing that for veterans with chronic LBP or hip or knee osteoarthritis pain, treatment with opioids resulted in worse pain severity at 1 year than treatment with non-opioid medication.[14]

Treatment with benzodiazepines was fairly uncommon and did not vary much across areas. As a result, there was no significant effect of benzodiazepine prescription rate on LBP outcomes in our analyses. However, a 5% treatment rate still seems unduly high, given the lack of evidence of effectiveness in LBP,[15] suggestive evidence of worsened pain relative to placebo in a randomized trial of sciatica,[16] and a strong recommendation against their use in the VA/DOD clinical practice guideline for treatment of LBP.

Behavioral therapies were uncommon but associated with an increased chance of ongoing LBP in one of our models, despite evidence suggesting their effectiveness in treating LBP and their being recommended in a number of LBP guidelines.[10,17] It is worth noting that behavioral therapies showed a statistically significant relationship to ongoing LBP utilization only when ongoing treatments were included in the definition of ongoing utilization, not when LBP diagnosis alone was used. Furthermore, guidelines recommend behavioral therapies only in chronic—not acute—LBP.[10,17] Although we used a lookback period to identify new onset cases of LBP and employed catchment area rates to control for confounding by indication, it is possible that behavioral therapies are still being used. Reasons for such use might include increased chronicity of cases or the treatment of some concomitant problem in addition to the LBP. These uses may be associated with ongoing treatment in the 6-12 month period despite resolution of the initial LBP complaint.

Our study has a number of limitations. As discussed, claims do not allow for assessment of the clinical details of cases or diagnoses. Moreover, we were not able to account for potential baseline differences in presentation or severity, except through the fairly crude lens of ICD code differences. We used a geographical approach to analysis to avoid any significant confounding by indication. However, it is possible that there are systematic differences in disease severity (e.g., due to training centers or certain operational hazards) across catchment areas that could influence results. We also tried to account for complexity by including—in addition to index ICD code—an indicator variable for cases with multiple LBP-related diagnosis codes at presentation as a potential marker of complexity. Similarly, a number of common and recommended treatments, such as patient education, advice to stay active, and non-steroidal anti-inflammatory medications (many of which are sold over-the-counter) could not be reliably assessed in claims data. Additionally, for active-duty service members, many encounters for LBP may occur without a formal visit claim appearing in the MDR. Moreover, there was no firm way to match the treatment with the index LBP diagnosis, so some of the treatments (for example opioid or benzodiazepine prescriptions) may have been for other conditions that occurred with or shortly after the index diagnosis of LBP. Similarly, our outcome measure was only a proxy measure for resolution of LBP: the absence of any additional claims indicating LBP or absence of any additional claims indicating LBP plus any ongoing treatments associated with LBP. Both possibilities are imperfect measures of LBP resolution. It is possible that some beneficiaries did not improve and continued to have LBP or had a recurrence but simply stopped seeking LBP care, thereby overestimating the amount of LBP resolution.[18] Conversely, some of the ongoing treatments associated with LBP in our broader outcome measure may have picked up treatments for other conditions, thereby underestimating the amount of LBP resolution. The use of both outcomes measures serves as somewhat of a sensitivity analysis, with the true rate of resolution likely falling somewhere in between.

In conclusion, our study found variability across catchment areas within TRICARE for the treatment of LBP. Higher rates of opioid prescription were consistently associated with worse outcomes across multiple different analytic approaches. Treatment patterns for active-duty beneficiaries were more consistent with guidelines for recommended care but still showed relatively modest rates of non-pharmacologic treatments and less modest rates of opioid and benzodiazepine prescribing, which are likely higher than warranted.

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**Table 1: Summary Statistics**

| | |
|---|---|
| Sample Size | 159,027 |
| Age Category | |
| 19-34 | 26.6% |
| 35-44 | 24.6% |
| 45-54 | 29.3% |
| 55-64 | 19.5% |
| Beneficiary Type | |
| Dependent | 14.9% |
| Retired | 51.4% |
| Active | 33.8% |
| Male | 56.2% |
| Index Diagnosis | |
| Dx = Lumbago/Backache | 72.00% |
| Dx = Dorsalgia | 15.20% |
| Two or more qualifying Index diagnoses | 14.20% |
| Dx = Sciatica | 9.50% |
| Dx = Thoracic or lumbosacral neuritis or radiculitis; radiculopathy | 5.20% |
| Dx = Degeneration of thoracolumbar, lumbar, or lumbosacral intervertebral disc | 4.70% |
| Dx = Spondylolisthesis, site unspecified | 4.30% |
| Dx = Lumbosacral spondylosis without myelopathy | 3.60% |
| Dx = Lumbar sprain/strain | 2.80% |
| Dx = Displacement of thoracolumbar, lumbar, or lumbosacral intervertebral disc | 2.50% |
| Dx = Other thoracolumbar, lumbar, or lumbosacral disc disorder | 0.20% |
| Dx = Spondylolysis, site unspecified | 0.20% |
| No LBP diagnosis 6-12 months after index event | 78.9% |
| No LBP diagnosis, surgery, or treatment 6-12 months after index event | 60.5% |

**Table 2: Treatment Rates by Beneficiary Category**

| | | Overall | Beneficiary Type | | |
|---|---|---|---|---|---|
| | | | Dependent | Retired | Active |
| Age | Mean | 43.30 | 35.52 | 51.34 | 34.49 |
| Physical Therapy (0-3 Months) | Mean | 27.2% | 23.3% | 19.3% | 40.9% |
| Manual Therapy (0-3 Months) | Mean | 16.7% | 16.2% | 12.4% | 23.4% |
| Opioid Prescribing (0-3 Months) | Mean | 21.3% | 21.7% | 25.2% | 15.1% |
| Benzodiazepines (0-3 Months) | Mean | 5.1% | 5.4% | 5.5% | 4.3% |
| Behavioral Therapies (0-3 Months) | Mean | 2.0% | 2.5% | 1.0% | 3.5% |
| Sample Size | N | 159,027 | 23,622 | 81,661 | 53,744 |

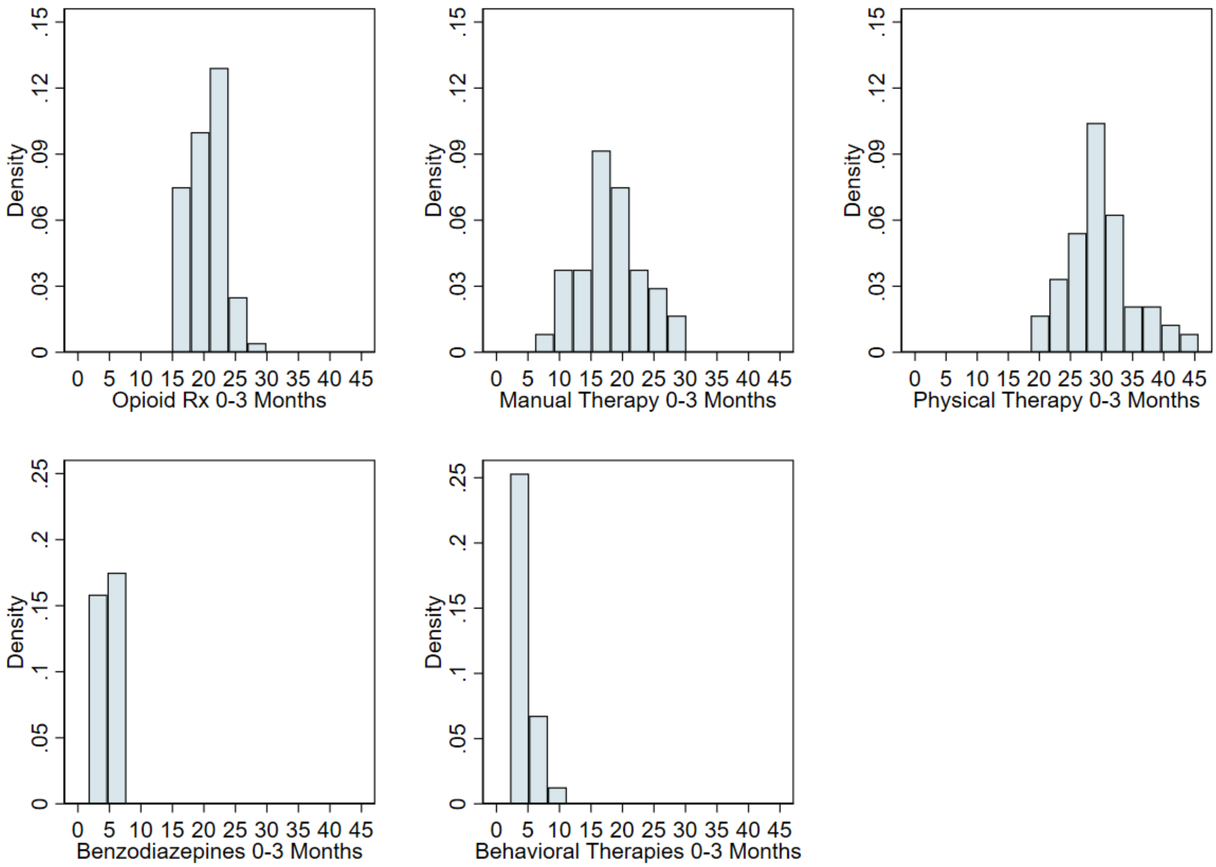
Notes: Measured at the individual level, not the catchment area. "Other" beneficiary categories are included with retirees. P values for dependents and retirees are all significant at p<.0001

**Table 3: Logistic Regression Results Including Odds Ratios for Successful Resolution of Low Back Pain (No Further LBP-related claims 6-12 Months After Index Event)**

| | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|
| **Catchment Area Treatment rates** | Odds Ratio | 95% C.I. | Odds Ratio | 95% C.I. | Odds Ratio | 95% C.I. |
| Opioids | 0.96 | (0.92-1.00) | 0.94 | (0.92-0.97) | 0.93 | (0.89-0.97) |
| Physical Therapy | 0.98 | (0.94-1.03) | 0.96 | (0.92-0.99) | 0.95 | (0.90-1.01) |
| Manual Therapy | 1.01 | (0.97-1.05) | 0.99 | (0.96-1.02) | 1.03 | (0.97-1.08) |
| Benzodiazepine | 1.01 | (0.97-1.04) | 1.00 | (0.97-1.04) | 0.98 | (0.92-1.04) |
| Behavioral Therapies | 1.00 | (0.97-1.03) | 0.97 | (0.94-0.99) | 1.03 | (0.99-1.07) |
| | | | | | | |
| **Outcome Variable** | No LBP Dx | | No LBP Dx or Treatment | | No LBP Dx | |
| Risk-adjustment covariates included? | Yes | | Yes | | Yes | |
| **Cohort** | All LBP | | All LBP | | Active Duty only | |
| | | | | | | |
| **Sample Size** | 159,027 | | 159,027 | | 53,744 | |

**Figure 1: Histogram of Rates of Treatments for Low Back Pain, by Catchment Area, 2015-19**

Note: Limited to Areas with at least 500 people in the back pain cohort. Treatments limited to the first 3 months following the index event (for those not receiving treatment prior to the index event)



## Online Appendix

**Table A.1: ICD-9 and ICD-10 Codes for Inclusion and Exclusion**

| | ICD Codes | Description |
|---|---|---|
| Inclusions | 721.3, M47.815, M47.816, M47.817, M47.895, M47.896, M47.897 | Lumbosacral spondylosis without myelopathy |
| | 722.10, M51.26, M51.27, M51.25 | Displacement of thoracolumbar, lumbar, or lumbosacral intervertebral disc |
| | 722.52, M51.35, M51.36, M51.37 | Degeneration of thoracolumbar, lumbar, or lumbosacral intervertebral disc |
| | 722.93, M51.85, M51.86, M51.87 | Other thoracolumbar, lumbar, or lumbosacral disc disorder |
| | 724.2, 724.5, M54.5, M54.50, M54.51, M54.59 | Lumbago/Backache |
| | 724.3, M54.3, M54.30, M54.31, M54.32, M54.4, M54.40, M54.41, M54.42 | Sciatica |
| | 724.4, M54.15, M54.16, M54.17 | Thoracic or lumbosacral neuritis or radiculitis; Radiculopathy |
| | M43.05, M43.06, M43.07 | Spondylolysis, site unspecified |
| | 738.4, M43.15, M54.16, M54.17 | Spondylolisthesis, site unspecified |
| | M54.89, M54.9 | Dorsalgia |
| | 847.2, S33.5 | Lumbar sprain, strain |
| Red Flag Diagnoses/Exclusions | 344.6-344.69, G83.4 | Cauda equina syndrome |
| | 736.79 | Foot drop |
| | 720.0-720.9, M45 | Ankylosing spondylitis |
| | 038-038.99, 995.9-995.99, A40, A41, R65 | Septicemia; SIRS (Sepsis) |
| | 788.3-788.39, N39.3, N39.4, R32 | Urinary incontinence |
| | 787.6-787.69, R15 | Bowel incontinence |
| | 805.4, 805.5, 806.4, 806.5, 839.20, 839.30, S32, S33.0, S33.1 | Trauma, fractures, and dislocations |

| | | |
|---|---|---|
| | 334.1, 342-342.99, 343-343.99, 344–344.6, 344.9, G80, G81, G11.4 | Paralysis |
| | 338.2, G89.2 | Chronic pain |
| | 140-239, C00-D49 | Cancer |

**Table A.2: CPT Codes Used to Identify LBP Treatments**

| Description | CPT Codes |
|---|---|
| Physical therapy | 29240, 29530, 29540, 97001, 97002, 97010, 97012, 97014, 97016, 97018, 97022, 97024, 97026, 97028, 97032-97036, 97110, 97112, 97113, 97116, 97124, 97140, 97150, 97530, 97535, 97542, 97760, 97762 |
| Manual therapy | 97140, 98040-98042, 98925-98929 |
| Behavioral therapies | 90832, 90834, 90837, 90853 |
| Lumbar epidural | 62311, 62319, 64483 |
| Lumbar facet/SIJ injection | 64475, G0260 |
| Traction | 97012 |
| Lumbar decompression | 63005, 63012, 63017, 63042, 63044, 63047, 63048, 63056, 63057 |
| Lumbar fusion | 22533, 22534, 22558, 22585, 22612, 22614, 22630, 22632-22634 |
| Lumbar microdiscectomy | 63030, 63035, 62380 |

# REPORT DOCUMENTATION PAGE

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The Association Between Low Back Pain Treatments and Health Outcomes: A Regional Analysis of the Military Health System (Journal Article)

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**13. SUPPLEMENTARY NOTES**

Project Leader: W. Patrick Luan

**14. ABSTRACT**

Little is known about the variability in patterns of care for LBP across the MHS. In this study, we use the Military Health System Data Repository (MDR), a centralized repository of data that includes direct care encounter data as well as purchased care claims, to characterize variations in care for LBP. Using these claims, we evaluate variations in utilization and outcomes among adult TRICARE beneficiaries with low back pain. In this claims-based analysis of TRICARE Prime beneficiaries aged 19-64, we found substantial variation in the treatment of LBP across catchment areas. Physical therapy was, on average, the most commonly used treatment among those we were able to assess with catchment area rates ranging from 17 – 39%. Opioid prescription was the next most commonly used treatment on average with catchment area rates ranging from 15 – 28% and was associated with significantly worse outcomes. Behavioral therapies were rarely used and were also associated with lower rates of LBP resolution when the definition of LBP resolution included ongoing treatments in addition to only LBP diagnoses.

**15. SUBJECT TERMS**

Variations; low back pain; military health system

| 16a. REPORT | 16b. ABSTRACT | 16c. THIS PAGE | 17. LIMITATION OF ABSTRACT | 18. NUMBER OF PAGES |
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