

**Initial Treatment
Intervention and
Average Total
Medicare A/B Costs
for FFS Beneficiaries
with an Incident Low
Back Pain (Lumbago)
Diagnosis in CY 2014**

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Introduction

A number of studies in the published literature assess the association between use of physical therapy for low back pain and the subsequent cost of care.¹⁻⁵ These studies provide important evidence indicating that the use of physical therapy early in the care process leads to reduced costs through less subsequent utilization of other types of healthcare services including reduced risk for use of downstream injections and surgeries among others.^{2,3,4,5} While at least one published study⁶ was based on Medicare claims data, the majority of these studies are derived from other databases or specific clinical settings.⁷

The Alliance for Physical Therapy Quality and Innovation (APTQI) engaged The Moran Company (TMC) to begin to assess different initial treatment interventions from a cost standpoint for low back pain within the Medicare program. The analysis presented here provides a comprehensive accounting of Medicare Parts A and B program spending for a population of beneficiaries based on the initial treatment intervention received following diagnosis. Using nationally representative Medicare claims datasets across multiple sites of service, we provide tabulations of total Medicare A/B spending on average for groups of beneficiaries with an incident lumbago (low back pain) diagnosis who received physical therapy first, injections first or surgeries first.⁸ In so doing, we begin to gain a descriptive picture of spending incurred during the period surrounding diagnosis and in the year following for beneficiaries who undergo different first line treatment pathways for low back pain.⁹

¹ Fritz, J. M., Magel, J. S., McFadden, M., Asche, C., Thackeray, A., Meier, W., & Brennan, G. (2015). Early physical therapy vs usual care in patients with recent-onset low back pain: A randomized clinical trial. *JAMA*, 314(14), 1459-1467.

² Fritz, J. M., Childs, J. D., Wainner, R. S., & Flynn, T. W. (2012). Primary care referral of patients with low back pain to physical therapy: impact on future health care utilization and costs. *Spine*, 37(25), 2114-2121.

³ Childs, J. D., Fritz, J. M., Wu, S. S., Flynn, T. W., Wainner, R. S., Robertson, E. K., ... & George, S. Z. (2015). Implications of early and guideline adherent physical therapy for low back pain on utilization and costs. *BMC health services research*, 15(1), 1.

⁴ Gellhorn, A. C., Chan, L., Martin, B., & Friedly, J. (2012). Management patterns in acute low back pain: the role of physical therapy. *Spine*, 37(9), 775.

⁵ Fritz, J. M., Kim, J., & Dorius, J. (2015). Importance of the type of provider seen to begin health care for a new episode low back pain: associations with future utilization and costs. *Journal of Evaluation in Clinical Practice*.

⁶ Ibid.

⁷ For example Military Health System claims, commercial claims or data from integrated healthcare delivery systems.

⁸ Medicare program data on beneficiary level prescription drug use is not available as a limited data set to researchers and therefore we were unable to assess prescription drug use as a first line treatment option in this analysis.

⁹ We note that Fritz, Brennan and Hunter evaluated use of physical therapy versus imaging first and the associated relationship with spending using data from primary care clinics in Utah. When advanced imaging was used in the first 6 weeks of low back pain diagnosis the odds of subsequent healthcare utilization increased. See: Fritz, J. M., Brennan, G. P., & Hunter, S. J. (2015). Physical therapy or advanced imaging as first management strategy following a new consultation for low back pain in primary care: associations with future health care utilization and charges. *Health services research*, 50(6), 1927-1940. These researchers also considered other types of initial management decisions for low back pain and found that use of physical therapy first was not associated with increased healthcare costs. See: Fritz, J. M., Brennan, G. P., Hunter, S. J., & Magel, J. S. (2013). Initial management decisions after a new consultation for low back pain: implications of the usage of physical therapy for subsequent health care costs and utilization. *Archives of physical medicine and rehabilitation*, 94(5), 808-816.

Executive Overview

Results from this assessment indicate that beneficiaries who are newly diagnosed with low back pain (as defined by the diagnosis code for lumbago) and receive physical therapy (PT) as a first line treatment option have lower total Medicare A/B costs on average in the period surrounding diagnosis and in the year following than do lumbago beneficiaries who receive injections or low back pain related surgeries as the initial treatment intervention. When incident lumbago beneficiaries do receive physical therapy, average total Medicare costs are also observed to be lower when therapy begins within the first 45 days of diagnosis. The findings from this report signal possible advantages of therapy as a potential cost saver relative to other treatment interventions for low back pain.¹⁰ These results lend promising support for the role of therapy early in the care continuum from a cost perspective.

Highlights of the study findings include:

- Our study population consisted of 472,000 Medicare Fee for Service (FFS) beneficiaries with an incident low back pain (lumbago) diagnosis from Medicare claims data in 2014. Almost 13% of these beneficiaries received low back pain related physical therapy as the first line treatment.
- Total Medicare A/B spending on average for beneficiaries who receive therapy as the first treatment option is ~19% less than total average Medicare A/B spending for beneficiaries who receive injections first and ~75% less than total average spending observed for the surgery first group.
- In the year following diagnosis, the difference in average spending was approximately 18% between the therapy first group and the injection first group, and approximately 54% between the therapy first group and the surgery first group of beneficiaries.
- Beneficiaries who receive therapy within the first 15 days of diagnosis are observed to have downstream costs that are ~27% lower on average than downstream costs observed for the group of beneficiaries who receive therapy between 45-90 days after diagnosis.

While the research presented in this report does not attempt to study health outcomes, the literature does lend evidence that early physical therapy following a primary care visit for low back pain provides moderate improvement in disability¹¹ and also shows that early PT is not associated with poor outcomes.¹² While further investigation is warranted, this analysis provides

¹⁰ Given the scope of this project, we did not attempt a detailed statistical analysis of the link between initial treatment inputs and spending outputs and accordingly do not demonstrate a causal relationship between initial choice of treatment and subsequent Medicare costs.

¹¹ Fritz, J. M., Magel, J. S., McFadden, M., Asche, C., Thackeray, A., Meier, W., & Brennan, G. (2015). Early physical therapy vs usual care in patients with recent-onset low back pain: A randomized clinical trial. *JAMA*, 314(14), 1459-1467.

¹² Ojha, H. A., Wyrsta, N. J., Davenport, T. E., Egan, W. E., & Gellhorn, A. C. (2016). Timing of Physical Therapy Initiation for Nonsurgical Management of Musculoskeletal Disorders and Effects on Patient Outcomes: A Systematic Review. *Journal of orthopaedic & sports physical therapy*, 46(2), 56-70.

signals, observed from Medicare program data, that beneficiaries who received therapy first had lower costs on average than did beneficiaries who received injections or surgery first. These findings thereby point to potential opportunities for incorporation of physical therapy into care redesign processes as an early and possible lower cost alternative to other forms of treatment. In a Medicare policy environment focused on value-based payment reform and care management strategies aimed in part, at cost reduction, understanding potential cost implications of first line treatment utilization is relevant and should continue to be investigated.

Brief Overview of Approach

To conduct this analysis, we analyzed the Medicare 5% Standard Analytic Files (SAFs)¹³ for years 2013-2015. We identified beneficiaries enrolled in Parts A and B FFS Medicare from the carrier and outpatient SAFs with incident low back pain (as per a lumbago diagnosis)¹⁴ present on claims during the period Feb 1, 2014 - Sept 30, 2014 (we refer to this as our identification timeframe).¹⁵ This identification timeframe allowed us to analyze claims submitted for these beneficiaries in the year prior and the year following diagnosis. We determined a beneficiary was an incident low back pain beneficiary when a lumbago diagnosis only appeared in the identification timeframe and was not present on a prior claim in the 2013 and 2014 outpatient or carrier SAFs. We also excluded beneficiaries with claims for low back pain related surgeries, injections and therapy in the year prior to diagnosis under the premise that these beneficiaries already had some types of lower back related conditions. Additionally, we reviewed claims in the year prior and year following our identification timeframe and dropped beneficiaries with claims containing other excludable conditions¹⁶ that might relate to lower back pain related conditions.

Once our population of interest was identified, we pulled all of their Medicare claims from key settings using the carrier, outpatient, inpatient, SNF, and home health SAFs to create a complete analytic data set for this research. We then used Health Care Common Procedure Coding System (HCPCS) codes and Inpatient Procedure (ICD-9) codes to identify the initial treatment intervention received following diagnosis. We assessed the use of physical therapy (herein referred to as therapy), injections, lumbar related surgeries and no therapy/injection/surgery (“TIS Services”) as first line treatment options for the incident lumbago population identified (we refer to this as initial treatment intervention).¹⁷ Therapy services were defined to include “always” therapy services and “sometimes” therapy services when an applicable modifier was present as per Centers for Medicare and Medicaid Services (CMS) published lists of therapy codes.¹⁸ We restricted therapy services included in the therapy first modality to therapy services

¹³ The 5% SAFs contain all of the final action claims for a 5% nationally representative sample of beneficiaries. The analysis presented here projects results to national levels via standard processes.

¹⁴ ICD-9-CM Code 724.2.

¹⁵ See Appendix A for additional detail on inclusion/exclusion criteria and technical approach.

¹⁶ See technical appendix.

¹⁷ Medicare prescription drug data are not available and for this reason we did not analyze use of opioids or other prescription medications and first line treatment options in this analysis.

¹⁸ Centers for Medicare and Medicaid Services. Therapy code list. Accessible at: <https://www.cms.gov/Medicare/Billing/TherapyServices/AnnualTherapyUpdate.html>

associated with a lower back pain related diagnosis. Procedure codes used to identify injections and lumbar related surgeries are listed in the technical appendix of this report.

We then classified incident lumbago beneficiaries by initial treatment intervention received and calculated total average Medicare A/B costs observed for those beneficiaries by the initial treatment intervention stratification (focusing on those beneficiaries who received some form of TIS service in the year following diagnosis). We trimmed the data for outliers¹⁹ and applied that outlier trimming to each initial treatment intervention subpopulation. For those beneficiaries who received therapy, we also assessed the time to start of therapy based on observance of the first Part B therapy claim visible in the data following initial diagnosis and considered the type of therapy received as per active, passive and allowed designations.²⁰ We also considered other points of interest including, physician specialty making the initial lumbago diagnosis and basic demographic information for the population of analysis.

¹⁹ Using standard CMS payment policy methodology of removing cases three standard deviations above / below the mean.

²⁰ Fritz, J. M., Cleland, J. A., & Brennan, G. P. (2007). Does adherence to the guideline recommendation for active treatments improve the quality of care for patients with acute low back pain delivered by physical therapists? *Medical care*, 45(10), 973-980. See also: Childs, J. D., Fritz, J. M., Wu, S. S., Flynn, T. W., Wainner, R. S., Robertson, E. K., ... & George, S. Z. (2015). Implications of early and guideline adherent physical therapy for low back pain on utilization and costs. *BMC health services research*, 15(1), 1.

Incident Low Back Pain (Lumbago) Beneficiaries by Initial Treatment

As shown in Table 1 below, we identified 472,000 Medicare FFS beneficiaries with an incident low back pain (lumbago) diagnosis present on claims during our identification timeframe. Almost 13% of these beneficiaries received low back pain related physical therapy as the first line treatment, ~11% received injections as the initial treatment intervention and less than 2% received a lumbar related surgery as the first treatment option. The majority of these beneficiaries (~74%) did not receive any lower back pain related physical therapy, injections or surgical treatment in the year following diagnosis.

Table 1. Initial Treatment Intervention for FFS Beneficiaries newly Diagnosed with Low Back Pain (Lumbago) in CY 2014

Initial Intervention	Incident Lumbago Beneficiaries	
	N	%
Therapy	60,000	12.7%
Injections	53,000	11.3%
Surgery	8,000	1.6%
No TIS Services	351,000	74.4%
Total	472,000	

2014 5% Carrier and Outpatient SAFs, national estimates presented

Initial Lumbago Diagnosis Occuring Between 2/1 - 9/30/14

Following identification of incident lumbago beneficiaries and groupings of those beneficiaries into initial intervention categories, we then focused on assessing tabulations of Medicare spending between different initial treatment interventions for the groups of beneficiaries who actually received some form of TIS treatment.

Average Total A/B Medicare Costs by Initial Treatment Intervention for those Beneficiaries who Received some form of TIS Treatment

Focus Period Surrounding Diagnosis

We analyzed average total Medicare A/B spending for the focus period surrounding beneficiaries' incident lumbago diagnosis for each of the groups of beneficiaries who received a TIS treatment. We defined the focus period as the 30 days prior through 90 days post diagnosis and calculated total Medicare A/B spending incurred during that time.^{21, 22} As shown in Table 2 below, incident lumbago beneficiaries who received therapy as the initial treatment intervention

²¹ Timing concepts applied to Episode of Care constructs often cover a pre and post time period when defining an episode of care timeframe. Health Care Payment Learning & Action Network (HCP LAN). Clinical Episode Payment Models Fact Sheet. Available at: <http://hcp-lan.org/workproducts/cep-factsheets.pdf>.

²² Throughout this analysis Medicare Spending reflects total Medicare Parts A and B spending for the beneficiaries included in this study as measured by allowed charges which includes the beneficiary portion.

are observed to have lower total Medicare costs on average than do beneficiaries who received other forms of treatment first.

Table 2. Average Total A/B Medicare Spending during 120 day Period Surrounding Incident Low Back Pain (Lumbago) Diagnosis by Initial Treatment Intervention

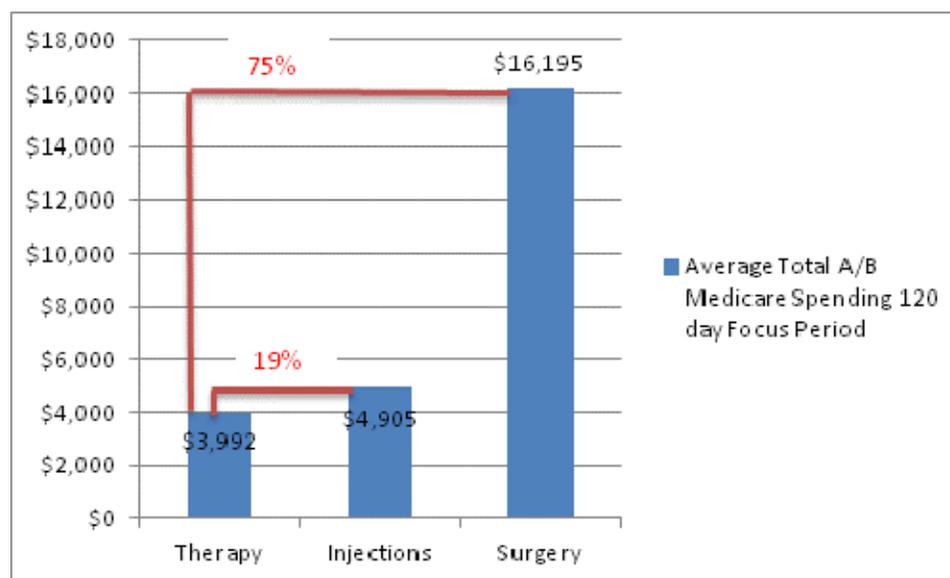
Initial Intervention	Beneficiaries		Average Total Medicare Spending During Focus Period					
			Total		Part A		Part B	
	N	%	Average	Std Dev	Average	Std Dev	Average	Std Dev
Therapy	60,000	12.7%	\$3,992	\$6,785	\$1,127	\$5,019	\$2,865	\$3,310
Injections	53,000	11.3%	\$4,905	\$7,818	\$1,595	\$5,884	\$3,309	\$3,709
Surgery	8,000	1.6%	\$16,195	\$27,597	\$10,912	\$25,164	\$5,283	\$4,868

CMS Carrier, Outpatient, Inpatient, Home Health, SNF Standard Analytic Files, 2014

Total Medicare spending reflects total allowed Medicare charges which includes the beneficiary portion. Focus period reflects 120 days surrounding diagnosis (30 days prior, 90 days post).

Total Medicare A/B spending on average for beneficiaries who receive therapy as the first treatment option, is \$3,992 or ~19% less than total average Medicare A/B spending for beneficiaries who receive injections first (\$4,905) and approximately 75% less than total average spending observed for the surgery first (\$16,195) group of beneficiaries (Chart 1).

Chart 1. Difference in Focus Period Average Total Medicare A/B Spending between Incident Low Back Pain (Lumbago) Beneficiaries who Receive Therapy First and Beneficiaries who Receive Injections or Surgery First



Year Prior and Year Following Diagnosis

We also tabulated total Medicare A/B spending in the year before and year after incident low back pain (lumbago) diagnosis for beneficiaries who received TIS treatment (Table 3).

Table 3. Average Total A/B Medicare Spending in the Year Prior and Year Following Incident Low Back Pain (Lumbago) Diagnosis by Initial Treatment Intervention

Initial Intervention	Beneficiaries		Average Total Medicare Spending				Trend Ratio
			Year Before		Year After		
	N	%	Average	Std Dev	Average	Std Dev	
Therapy	60,000	12.7%	\$8,082	\$15,604	\$11,151	\$21,037	1.38
Injections	53,000	11.3%	\$9,274	\$16,762	\$13,606	\$22,866	1.47
Surgery	8,000	1.6%	\$8,309	\$18,694	\$24,294	\$36,772	2.92

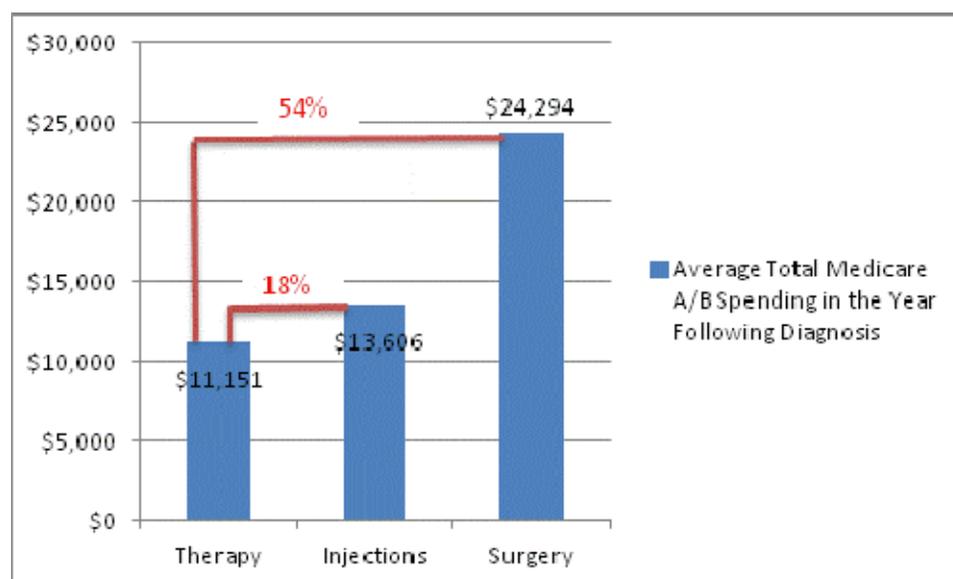
CMS Carrier, Outpatient, Inpatient, Home Health, SNF Standard Analytic Files, 2014

Total Medicare spending reflects total allowed Medicare charges which includes the beneficiary portion.

Focus Period 30 days prior/90 days post incident lumbago diagnosis

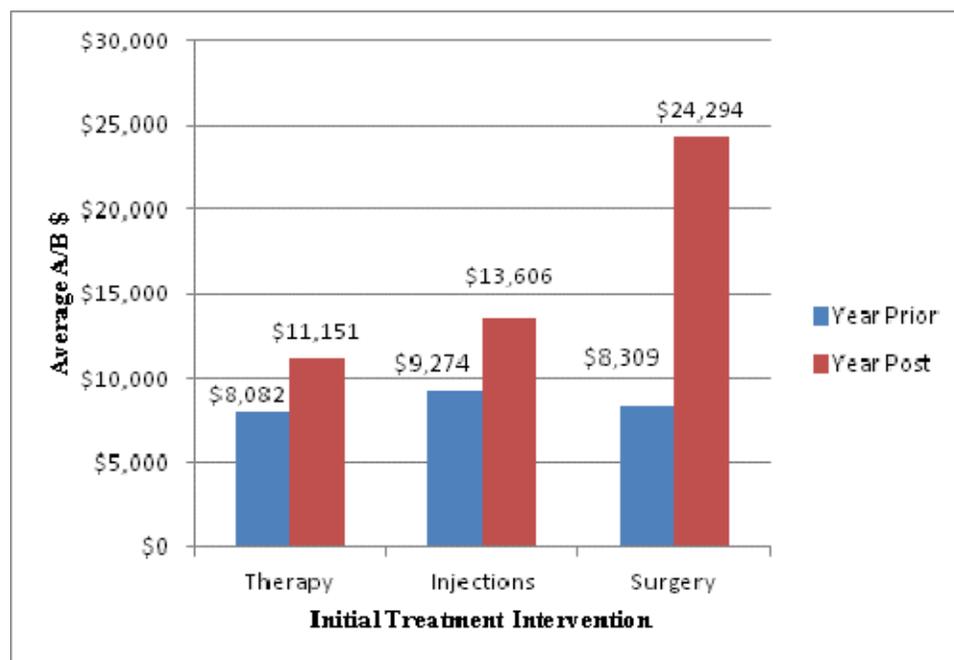
The data show that average total spending for incident low back pain (lumbago) beneficiaries who received therapy as the initial treatment intervention was \$11,151 in the year following diagnosis as compared to \$13,606 for beneficiaries who received injections first and \$24,294 for beneficiaries who received surgery as the initial treatment intervention. This reflects a difference in average spending of approximately 18% between the therapy first group and the injection first group and of approximately 54% between the therapy first group and the surgery first group of beneficiaries (Chart 2).

Chart 2. Difference in Average Total Medicare A/B Spending in the Year Following Diagnosis between Incident Low Back Pain (Lumbago) Beneficiaries who Receive Therapy First and Beneficiaries who Receive Injections or Surgery First



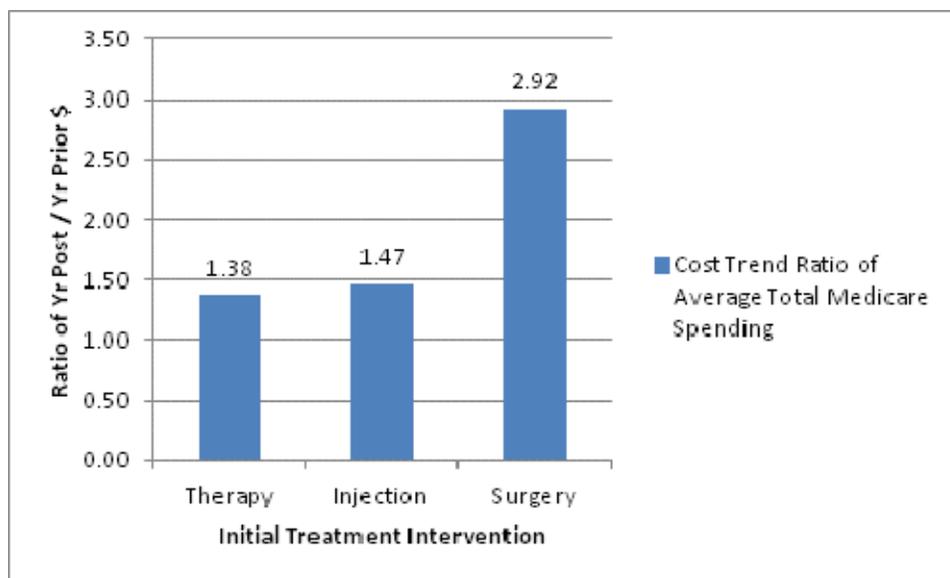
We note that the therapy first group of beneficiaries also had lower total A/B costs on average than the other initial intervention groups in the year prior to diagnosis (Chart 3).

Chart 3. Average Total A/B Medicare Spending in the Year Before and Year After Diagnosis by Initial Treatment Intervention for Incident Lumbago Beneficiaries



To further consider pre/post diagnosis spending within each group of beneficiaries, we calculated the ratio of average total A/B spending in the year following diagnosis compared to the year before diagnosis for each initial intervention group to assess the trend in average beneficiary spending within each category of beneficiaries and comparatively between groups of beneficiaries (we refer to this as the cost trend ratio). This cost trend ratio provides another signal suggesting that average total spending for incident lumbago beneficiaries who receive therapy as the first treatment option have lower total Medicare A/B costs than do beneficiaries who receive injections or surgery first. Specifically, the cost trend ratio for the therapy first group of beneficiaries is lower at 1.38 than the cost trend ratio for the injections first (1.47) or surgery first (2.92) group (Chart 4).

Chart 4. Ratio of Average Total Medicare Spending in the Year Following Diagnosis to the Year Prior by Initial Treatment Intervention



Average Total A/B Medicare Costs for Beneficiaries who Receive Therapy

Time to Start of Therapy

To further evaluate the group of beneficiaries who received therapy,²³ we segmented them into subcategories based on the time (in days) to start of therapy following diagnosis and calculated average total Medicare A/B spending for each subcategory of time based groupings (Table 4, Chart 5). Beneficiaries who received therapy within the first 45 day following diagnosis have lower average total Medicare A/B spending in the focus period surrounding diagnosis as well as in the year following than do beneficiaries who receive therapy and start that therapy after 45 days. For example, beneficiaries who receive therapy within the first 15 days of diagnosis incur \$4,222 in total Medicare spending on average as compared to an average of \$4,621 for the group of beneficiaries who received therapy between 45-90 days following diagnosis. This represents an approximate 9% difference in average spending or a difference of almost \$400.

This directional trend is more pronounced when evaluating spending in the year following the focus period. Beneficiaries who receive therapy within the first 15 days of diagnosis have downstream costs (year following) that are ~\$3,500 less (or 27% lower) than downstream costs observed for the group of beneficiaries who receive therapy between 45-90 days.

²³ In this analysis we include beneficiaries who received therapy as the initial treatment intervention and who received therapy subsequent to a different initial treatment intervention so as to capture all beneficiaries in our data set who received therapy at some point during our analytic timeframe.

Table 4. Average Total A/B Medicare Spending for Beneficiaries who Receive Therapy by Time to Start of Therapy, Focus Period and Year Following

Days to Start of Therapy	Beneficiaries		Average Total Medicare Spending			
			Focus Period		Year After	
	Number	Percentage	Average	Std Dev	Average	Std Dev
Between 0-15	16,000	22.4%	\$4,222	\$7,015	\$9,574	\$18,266
Between 16-30	10,000	14.7%	\$4,061	\$7,661	\$9,765	\$16,249
Between 31-45	7,000	9.5%	\$4,253	\$6,654	\$10,517	\$16,852
Between 45-90	9,000	12.8%	\$4,621	\$7,088	\$13,153	\$31,649
Between 91-180	9,000	12.5%	\$5,964	\$10,243	\$14,999	\$23,996
Greater than 180	20,000	28.0%	\$5,063	\$10,588	\$14,661	\$23,473

CMS Carrier, Outpatient, Inpatient, Home Health, SNF Standard Analytic Files, 2014

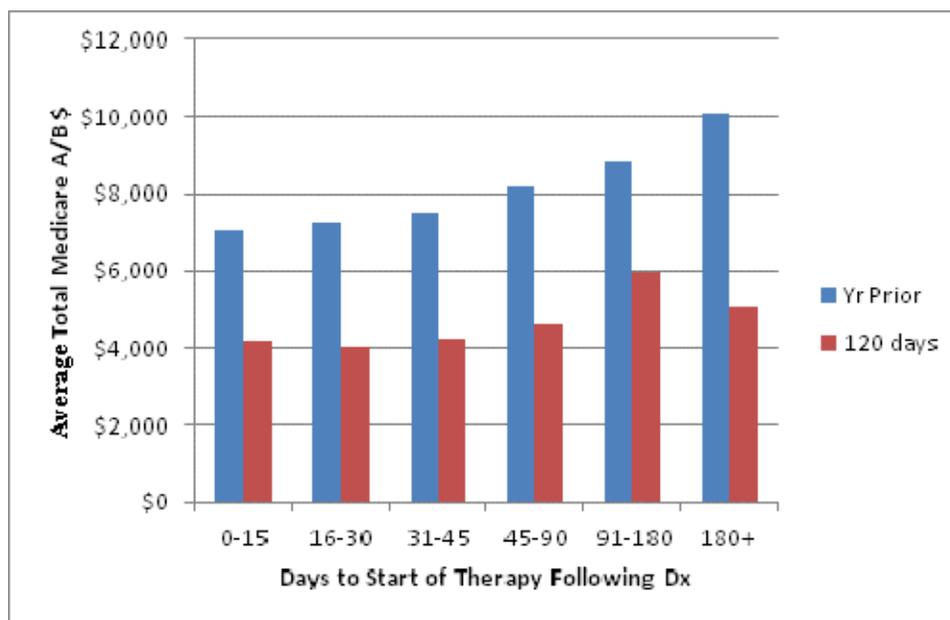
Subset of beneficiaries that utilized therapy services

Total Medicare spending reflects total allowed Medicare charges which includes the beneficiary portion.

Beneficiary population may not sum to prior totals due to rounding and because all beneficiaries who received therapy are reflected here.

Focus period reflects 30 days prior to diagnosis through 90 days after diagnosis

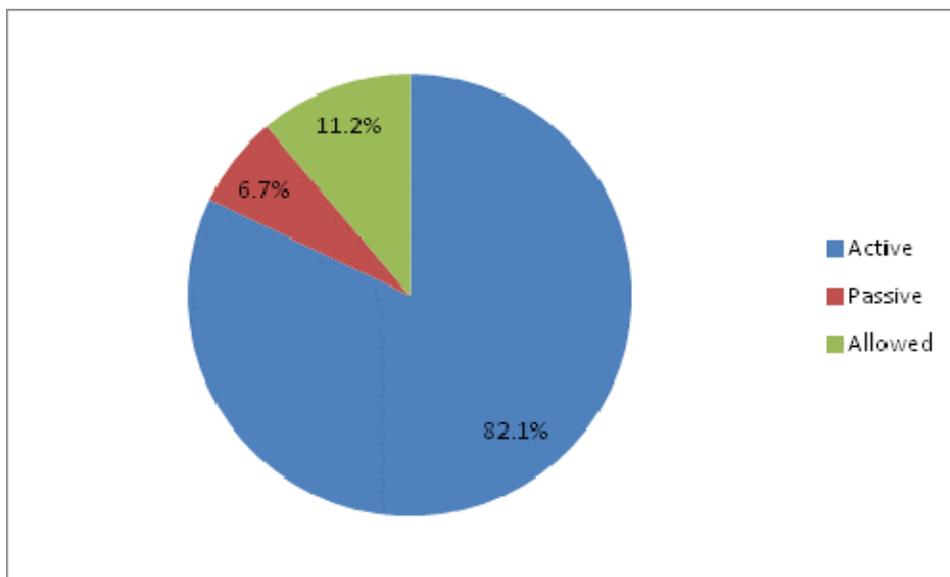
Chart 5. Average Total A/B Medicare Spending for Beneficiaries who Receive Therapy by Time to Start of Therapy, Focus Period, Year Following



Type of Therapy

We also considered the type of therapy the beneficiaries included in this analysis received. We classified therapy codes into different categories of therapy services based on active, passive and allowed designations as has been done in previously published studies.²⁴ As shown in Chart 6 below, 82% of average spending for therapy services in the therapy first group were for active physical therapy services.²⁵

Chart 6. Type of Physical Therapy Service Codes Submitted for the Therapy First Group by Active, Passive and Allowed Designations, Percent of Total



²⁴ As per Fritz, Childs, Wainner et al (2012), Fritz, Cleland, Speckman et al (2008) and Fritz, Cleland, Brennan (2007) therapy procedure codes are categorized into active therapy which tend to be consistent with guideline recommendations, passive therapy which tend to reflect certain types of therapy procedures and allowed which tend to reflect equipment based services. To categorize CPT codes into these categories consistent with the year of the data analyzed, we sought clinical guidance from an APTQI expert. The list of therapy codes and associated classifications is shown in Appendix A.

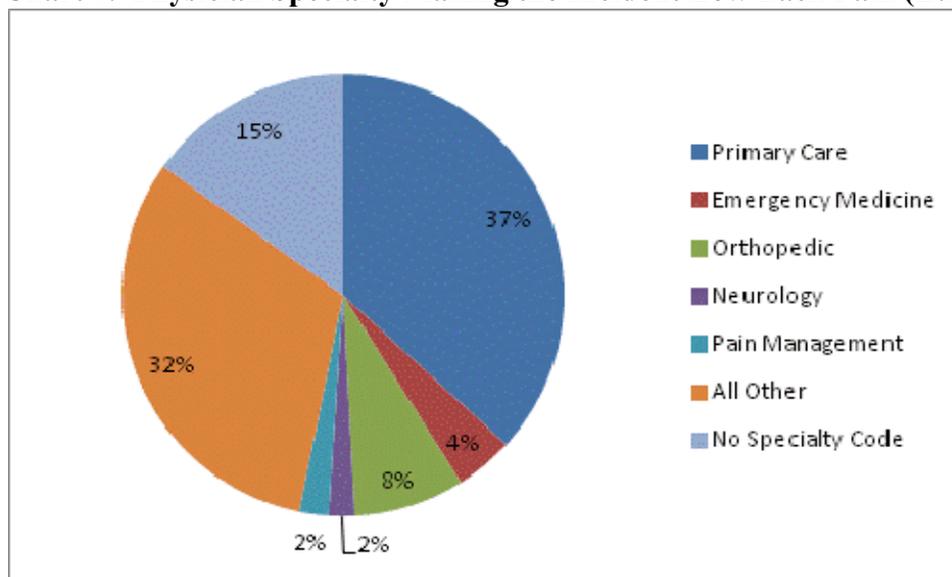
²⁵ Childs, Fritz et al (2015) have found that adherence to early and active therapy protocols was associated with significantly lower utilization of other types of healthcare services. Earlier work by Friz, Cleland, Speckman et al (2008) as well as Fritz, Cleland, Brennan et al (2007) found that active therapy was associated with better outcomes and reduced utilization in the long term and short term respectively. See: Fritz, J. M., Cleland, J. A., & Brennan, G. P. (2007). Does adherence to the guideline recommendation for active treatments improve the quality of care for patients with acute low back pain delivered by physical therapists? *Medical care*, 45(10), 973-980 and Fritz, J. M., Cleland, J. A., Speckman, M., Brennan, G. P., & Hunter, S. J. (2008). Physical therapy for acute low back pain: associations with subsequent healthcare costs. *Spine*, 33(16), 1800-1805. Other studies assessing early PT for pain of different anatomic areas have also shown that use of early therapy was more likely to achieve improvement in disability and other scale measures (see: Horn, M. E., Brennan, G. P., George, S. Z., Harman, J. S., & Bishop, M. D. (2016) A value proposition for early physical therapist management of neck pain: a retrospective cohort analysis. *BMC Health Services Research*, 16(1), 253).

Physician Specialty

Incident Low Back Pain (Lumbago) Diagnosis by Physician Specialty

To assess the physician specialty making the incident low back pain diagnosis (as defined by a diagnosis code for lumbago) for beneficiaries included in this analysis we evaluated the provider specialty designation included on the claim identified as the incident lumbago claim in our analytic timeframe. In instances when the incident lumbago claim was submitted by a provider where provider specialty is not applicable (e.g., hospital outpatient), we identified the first claim following diagnosis submitted for that beneficiary by a professional provider and analyzed the specialty designation included on it. As shown in Chart 7 below, the largest proportion (37%) of incident lumbago diagnoses for beneficiaries included in this analysis are made by primary care physicians.^{26,27} Based on this analysis, orthopedic physicians account for approximately 8% of the incident lumbago diagnoses made for beneficiaries included in this analysis, followed by emergency medicine (~4%), neurology (~2%) and pain management (~2%). A number of other physician specialties appear in the claims with less than 2% frequency and are not separately shown here, however they are all grouped into an all other category reflected in Chart 7. We were unable to reasonably determine physician specialty making the incident lumbago diagnosis for approximately 15% of the beneficiaries included in this analysis.

Chart 7. Physician Specialty Making the Incident Low Back Pain (Lumbago) Diagnosis



²⁶ We grouped physicians (and non-physician providers as applicable) who self designate their specialty as general practice, family practice, internal medicine, pediatric medicine, geriatric medicine, or nurse practitioner into an overall primary care category.

²⁷ We note that published studies also identify primary care as the predominant referral source or point of entry for low back pain patients. See: Fritz, J. M., Kim, J., & Dorius, J. (2015). Importance of the type of provider seen to begin health care for a new episode low back pain: associations with future utilization and costs. *Journal of Evaluation in Clinical Practice*.

Initial Treatment Pathway by Physician Specialty

We also considered the initial treatment intervention beneficiaries received by the type of physician making the initial low back pain diagnosis (as defined by a lumbago diagnosis code).²⁸ As shown in Table 5, the data suggest that orthopedic physicians refer a larger portion (21%) of their beneficiaries to therapy first compared to other specialties making the initial diagnosis, while pain management physicians appear to send a larger portion (36%) of their beneficiaries for injections first compared to other specialties making the initial diagnosis. In all cases, the majority of beneficiaries diagnosed with incident lumbago do not receive any form of TIS treatment²⁹ regardless of physician specialty.

Table 5. Initial Treatment Intervention Received by the Physician Specialty Making the Incident Low Back Pain (Lumbago) Diagnosis

Initial Intervention	Physician Specialty Making Initial Diagnosis											
	PCP		EM		ORTHO		NEURO		PAIN		OTHER	
	Count of Incident Lumbago Beneficiaries											
	N	%	N	%	N	%	N	%	N	%	N	%
Therapy	22,000	13%	2,000	11%	8,000	21%	1,000	10%	1,000	9%	22,000	15%
Injections	15,000	9%	1,000	5%	9,000	24%	2,000	20%	4,000	36%	20,000	13%
Surgery	2,000	1%			1,000	3%	1,000	10%			3,000	2%
No TIS Servies	134,000	77%	16,000	84%	20,000	53%	6,000	60%	6,000	55%	105,000	70%
Total Beneficiaries	173,000		19,000		38,000		10,000		11,000		150,000	

CMS SAFs 2014. Period reflects patients with an initial Lumbago Dx between February 1 2014 through September 30 2014

Beneficiary Counts may not sum to prior table totals due to rounding, dropping of beneficiaries for whom physician specialty could not be determined or blinding protocols.

Primary Care includes General Practice, Family Practice, Internal Medicine, Pediatric Medicine, Geriatric Medicine, and Nurse Practitioner specialties.

Orthopedic includes orthopedic surgeons, sports medicine, and physical medicine specialties.

Neurology includes neurology and neurosurgery specialties.

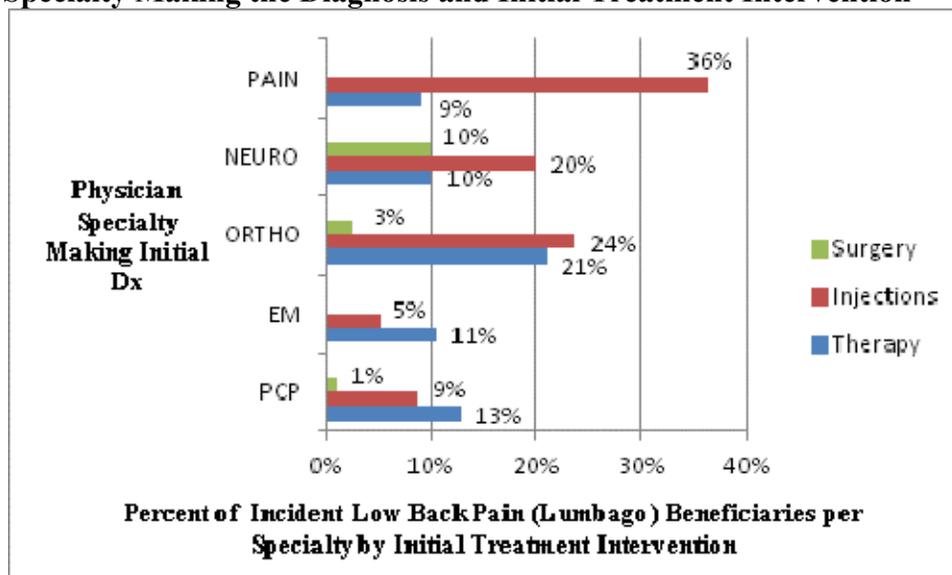
Pain Management includes pain management and interventional pain management specialties.

This information is also presented in Chart 8. As illustrated, 21% of beneficiaries diagnosed by orthopedic physicians receive therapy as the initial treatment intervention, followed beneficiaries initially diagnosed by primary care physicians (13%), emergency medicine (11%), neurology (10%) and pain specialists (9%). Conversely, a larger portion of beneficiaries initially diagnosed by pain management physicians (36%) receive injections first, followed by orthopedic physicians (24%), neurology specialties (20%), primary care (9%) and emergency medicine (5%).

²⁸ We note that the literature suggests that type of provider where a patient begins care may have important implications for the costs associated with a low back pain episode of care. See: Fritz, J. M., Kim, J., & Dorius, J. (2015). Importance of the type of provider seen to begin health care for a new episode low back pain: associations with future utilization and costs. *Journal of Evaluation in Clinical Practice*.

²⁹ As measured by presence of claims in the Medicare data set for TIS services.

Chart 8. Percent of Incident Low Back Pain (Lumbago) Beneficiaries by Physician Specialty Making the Diagnosis and Initial Treatment Intervention



Time to Start of Therapy by Specialty

We also evaluated time to start of therapy, for those beneficiaries who receive therapy during any point in our analytic timeframe, by the physician specialty making the initial diagnosis to gain a sense of whether certain specialties tend to refer patients for therapy earlier than others. As shown in Table 9, the data suggest that orthopedic physicians refer a larger portion (34%) of their beneficiaries who receive therapy to therapy early (within 0-15 days of diagnosis) than do other physician specialties.

Table 9. Beneficiaries that Utilized Therapy Services by Days to Start of Therapy and Physician Specialty that made Initial Low Back Pain (Lumbago) Diagnosis

	PCP	EM	ORTHO	NEURO	PAIN	Other
Count of Beneficiaries that Utilized Therapy and % by Time to Start						
Total	25,000	3,000	10,000	2,000	2,000	26,000
Between 0-15 Days	22%	20%	34%	18%	19%	21%
Between 16-30 Days	15%	12%	17%	13%		15%
Between 31-45 Days	10%		8%			10%
Between 45-90 Days	13%	12%	11%	11%	16%	15%
Between 91-180 Days	13%	18%	10%	11%		14%
Greater than 180 Days	27%	30%	22%	41%	37%	26%

CMS SAFs 2014-2015

Counts reflect all beneficiaries receiving therapy by specialty making the initial diagnosis not just those who received therapy as the initial treatment modality. Primary Care includes General Practice, Family Practice, Internal Medicine, Pediatric Medicine, Geriatric Medicine, and Nurse Practitioner specialties.

Orthopedic includes orthopedic surgeons, sports medicine, and physical medicine specialties.

Neurology includes neurology and neurosurgery specialties.

Pain Management includes pain management and interventional pain management specialties.

Basic Incident Low Back Pain (Lumbago) Beneficiary Demographics

Table 10 below outlines basic demographic information for the beneficiaries included in this analysis. As shown, incident low back pain beneficiaries (as defined by a lumbago diagnosis code) who receive therapy first tend to be slightly older (average age: 68 years) and are more often women (65.5%) than are beneficiaries who receive injections first, surgeries first or no TIS treatment.³⁰ It appears that the therapy first group of beneficiaries are less often disabled and less often qualify for dual eligible status³¹ than do the other groups of incident lumbago beneficiaries.³² A deeper dive on demographic issues would be interesting, but was beyond what we considered in this analysis.

Table 10. Basic Demographic Information for Incident Low Back Pain (Lumbago) Beneficiaries

Initial Intervention	Beneficiaries		Average	%	%	% Dual
	N	%	Age	Female	Disabled	Eligibles
Therapy	60,000	12.7%	68.1	65.5%	29.6%	27.1%
Injections	53,000	11.3%	66.7	61.9%	37.9%	29.5%
Surgery	8,000	1.6%	64.1	50.5%	44.3%	27.1%
No TIS Servies	351,000	74.4%	65.4	59.6%	41.7%	39.3%
Total	472,000					

2014 5% Carrier and Outpatient SAFs, national estimates presented

Initial Lumbago Diagnosis Occuring Between 2/1 - 9/30/14

The “state buy-in variable” is used to identify dual status. TMC has been advised by CMS that this approach may slightly over-state actual levels of Medicaid eligibility in states that pay the Part B premium for non-Medicaid eligible beneficiaries.

³⁰ In 2015, the average age of Medicare FFS beneficiaries was 71 and approximately 54% of Medicare FFS beneficiaries were women. Derived from 2015 Medicare Beneficiary Characteristics Data available at: https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Chronic-Conditions/Medicare_Beneficiary_Characteristics.html.

³¹ We note that dual eligible status could be overestimated here. The “state buy-in variable” is used to identify dual status. TMC has been advised by CMS that this approach may slightly over-state actual levels of Medicaid eligibility in states that pay the Part B premium for non-Medicaid eligible beneficiaries.

³² In 2015, approximately 20% of Medicare FFS beneficiaries were dual eligible (derived from 2015 Medicare Beneficiary Characteristics Data available at: https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Chronic-Conditions/Medicare_Beneficiary_Characteristics.html) while approximately 16% of the overall Medicare population and Part B population specifically were disabled (derived from Table II.B1 of the 2016 Medicare Trustees Report available at: <https://www.cms.gov/research-statistics-data-and-systems/statistics-trends-and-reports/reportstrustfunds/downloads/tr2016.pdf>).

Appendix A: Additional Detail on Technical Approach

For this analysis, we used Medicare Part A and B limited data set (LDS) standard analytic file (SAF) 5% sample data from the CMS carrier, outpatient, inpatient, skilled nursing facility, home health agency, hospice, and durable medical equipment claims data files and Medicare beneficiary information in the denominator data files covering the years 2013 through 2015 to construct the analytic files for the project. These CMS SAF 5% data files are based on a 5% nationally representative sample of Medicare fee-for-service (FFS) beneficiaries and includes 100 percent of their Medicare claims. We project final results for this study to the national level per the standard CMS weighting processes.

For the study, we identified FFS beneficiaries that had a low back pain lumbago (ICD-9 diagnosis code 724.2) diagnosis (Dx) in the outpatient and carrier SAFs during the period between Feb 1, 2014 and Sept 30, 2014. This time frame allowed us to analyze total Medicare spending including Medicare payments as well as beneficiary out-of-pocket costs (i.e., co-insurance, co-payments, deductibles, other payer payments, etc.), where applicable in the 120 day period surrounding (i.e., 30 days prior through 90 days following) the incident lumbago diagnosis, as well as the year before and the year following the incident Dx focus period. In order for a beneficiary with an incident lumbago Dx to be included in the study and ensure that we fully captured their complete cost information, the beneficiary needed to be continuously enrolled as a FFS beneficiary over the three year period (e.g., no dropping of Medicare Part A or B coverage, and no Medicare Part C coverage). In addition, beneficiaries were excluded from the analysis if they died during the study period or utilized hospice services. Additional technical exclusions were applied such as when the gender or age of the beneficiary were unknown, or the beneficiary was not mapped to a valid unique patient identifier.

In order to identify the subset of beneficiaries with a new low back pain (i.e. lumbago) Dx, additional exclusion criteria were applied. Beneficiaries were excluded from the analysis if they had lower back related surgeries, injections, or therapy in the year prior to the incident lumbago Dx period, or if patients had a complicating diagnosis such as cancer, were pregnant, or had spine related chronic diseases, infections, accidents, fractures, etc.³³

Based on patient and date of service information, we next identified the initial intervention (i.e. therapy (T), injections (I), surgery (S), or no TIS services) that the patient received following the incident lumbago Dx (See Tables A1-3 for list of HCPCS codes used to identify injections and surgeries, See CMS lists of therapy codes for the applicable years for HCPCS used to identify therapy services, See also Table A4). In constructing the analytic file we merged in information on the initial TIS intervention and patient demographic information, and added variables for the number of days to start of therapy services (when applicable) following the incident lumbago Dx; identified the specialty of the provider making the incident lumbago Dx;³⁴ computed total

³³ See Cherkin DC, Deyo RA, Volinn E, and Loeser JD. Use of the International Classification of Diseases (ICD-9-CM) to identify hospitalizations for mechanical low back problems in administrative databases. *Spine*. 1992 Jul 17: 817–825, as cited and used by Gellhorn AC, Chan L, Martin B, and Friedly J. Management Patterns in Acute Low Back Pain: the Role of Physical Therapy. *Spine*. 2012 Apr 20: 775–782.

³⁴ In cases where the incident lumbago Dx was made in an outpatient setting (i.e., where no physician specialty information is reported on the claim), we identified the specialty of the physician for the first lower back pain related

Medicare spending during the focus period, the year prior to the focus period, and the year following the focus period. For cases where therapy was provided, we constructed variables for active, passive, and other allowed Medicare therapy spending based on HCPCS-level type of therapy service categorized information obtained from APTQI as is consistent with prior literature (Table A4).

Lastly, we computed mean spending and standard deviations overall, by initial TIS intervention categories, by days to start of therapy category, by physician specialty category, as well as by selected cross-tabulations. For each category we examined total Medicare spending during the focus period, and the year prior to and the year following the focus period, as well as Part A and Part B spending during the focus period. To trim the data for outliers overall and by TIS intervention, we identified and excluded cases where total Medicare spending during the focus period was greater than or less than three standard deviations from the geometric mean of total Medicare focus period spending.

claim in the carrier data to reasonably approximate the specialty of the provider making the incident lumbago Dx. Even with this approximation, approximately 15% of cases in the study could not be mapped to a physician specialty for the incident lumbago Dx.

Table A1. HCPCS Codes Used to Identify Low Back Related Surgeries

Surgical Procedures of Interest	2013	2014	2015
Laminectomy			
Remove spine lamina 1/2 lmbr	63005	63005	63005
Remove lamina/facets lumbar	63012	63012	63012
Remove spine lamina >2 lmbr	63017	63017	63017
Laminotomy			
Low back disk surgery	63030	63030	63030
Spinal disk surgery add-on	63035	63035	63035
Laminotomy single lumbar	63042	63042	63042
Laminotomy addl lumbar	63044	63044	63044
Percutaneous Laminotomy/laminectomy			
Perq lamot/lam lumbar	0275T	0275T	0275T
Laminectomy, facetectomy and foraminotomy			
Remove spine lamina 1 lmbr	63047	63047	63047
Remove spinal lamina add-on	63048	63048	63048
Laminectomy w myelotomy			
Incise spinal cord tract(s)	63170	63170	63170
Percutaneous Vertebroplasty			
Perq lumbosacral injection	22521	22521	22511
Vertebroplasty addl inject	22522	22522	22512
Lumbar Spine Fusion			
Lumbar spine fusion	22558	22558	22558
Lat lumbar spine fusion	22533	22533	22533
Lat thor/lumb addl seg	22534	22534	22534
Prescrl fuse w/ instr l5-s1	22586	22586	22586
Lumbar spine fusion	22612	22612	22612
Spine fusion extra segment	22614	22614	22614
Lumbar spine fusion	22630	22630	22630
Spine fusion extra segment	22632	22632	22632
Lumbar spine fusion combined	22633	22633	22633
Spine fusion extra segment	22634	22634	22634
Prescrl fuse w/o instr l5/s1	0195T	0195T	0195T
Prescrl fuse w/o instr l4/l5	0196T	0196T	0196T
Prescrl fuse w/ instr l4/l5	0309T	0309T	0309T

Table A2. HCPCS Used to Identify Low Back Related Injections

Pain Management Injection Procedures of Interest			
	2013	2014	2015
Epidural Steroid Injections			
Inject spine lumbar/sacral	62311	62311	62311
Inject spine w/cath lmb/sacr	62319	62319	62319
Inj foramen epidural l/s	64483	64483	64483
Inj foramen epidural add-on	64484	64484	64484
Njx tfrml eprl w/us lumb/sac	0230T	0230T	0230T
Njx tfrml eprl w/us lumb/sac	0231T	0231T	0231T
Paravertebral Facet Joint/ Nerve Injections			
Inj paravert f jnt l/s 1 lev	64493	64493	64493
Inj paravert f jnt l/s 2 lev	64494	64494	64494
Inj paravert f jnt l/s 3 lev	64495	64495	64495
Njx paravert w/us lumb/sac	0216T	0216T	0216T
Njx paravert w/us lumb/sac	0217T	0217T	0217T
Njx paravert w/us lumb/sac	0218T	0218T	0218T
Trigger Point Injections			
Inj trigger point 1/2 muscl	20552	20552	20552
Inject trigger points 3/>	20553	20553	20553
Sacroiliac Joint Injection			
Inject sacroiliac joint	27096	27096	27096
	G0260	G0260	G0260

Table A3. ICD-9 Procedure Codes Used to Identify Inpatient Procedures of Interest

ICD-9 Procedure Codes	
Reopening of laminectomy site	03.02
Other exploration and decompression spinal canal	03.09
Injection of anesthetic into spinal canal for analgesia	03.91
Injection of other agent into spinal canal	03.92
Excision of intervertebral disc	80.51
Spinal fusion, NOS	81.00
Lumbar and lumbosacral fusion of the anterior column, anterior techniq	81.06
Lumbar and lumbosacral fusion of the posterior column, posterior tech	81.07
Lumbar and lumbosacral fusion of the anterior column, posterior techn	81.08
Fusion or refusion of 2-3 vertebrae	81.62
Fusion or refusion of 4-8 vertebrae	81.63
Fusion or refusion of 9 or more vertebrae	81.64
Percutaneous Vertebroplasty	81.65
Injection of therapeutic substance into joint or ligament	81.92
Injection of steroid	99.23
Injection or infusion of other therapeutic or prophylactic substance	99.29

Table A4a. Type of Therapy HCPCS Code Designation, Active

Active, Passive, Allowed	HCPCS	Short Description	Always/Sometimes Therapy
Active	92507	Speech/hearing therapy	Always
Active	92508	Speech/hearing therapy	Always
Active	92526	Oral function therapy	Always
Active	92609	Use of speech device service	Always
Active	97110	Therapeutic exercises	Always
Active	97112	Neuromuscular reeducation	Always
Active	97113	Aquatic therapy/exercises	Always
Active	97116	Gait training therapy	Always
Active	97124	Massage therapy	Always
Active	97139	Physical medicine procedure	Always
Active	97140	Manual therapy 1/> regions	Always
Active	97150	Group therapeutic procedures	Always
Active	97530	Therapeutic activities	Always
Active	97533	Sensory integration	Always
Active	97535	Self care mngment training	Always
Active	97537	Community/work reintegration	Always
Active	97542	Wheelchair mngment training	Always
Active	97760	Orthotic mgmt and training	Always
Active	97761	Prosthetic training	Always
Active	97762	C/o for orthotic/prosth use	Always
Active	97799	Physical medicine procedure	Always
Active	90901	Biofeedback train any meth	Sometimes
Active	90911	Biofeedback peri/uro/rectal	Sometimes
Active	92520	Laryngeal function studies	Sometimes
Active	95992	Canalith repositioning proc	Sometimes
Active	97532	Cognitive skills development	Sometimes
Active	97597	Rmvl devital tis 20 cm/<	Sometimes
Active	97598	Rmvl devital tis addl 20cm/<	Sometimes
Active	97602	Wound(s) care non-selective	Sometimes
Active	97605	Neg press wound tx </=50 cm	Sometimes
Active	97606	Neg press wound tx >50 cm	Sometimes
Active	97610	Low frequency non-thermal us	Sometimes
Active	G0456	Neg pre wound <=50 sq cm	Sometimes
Active	G0457	Neg pres wound >50 sq cm	Sometimes

Table A4b. Type of Therapy HCPCS Code Designation, Passive

Active, Passive, Allowed	HCPCS	Short Description	Always/Sometimes Therapy
Passive	92606	Non-speech device service	Always
Passive	97010	Hot or cold packs therapy	Always
Passive	97012	Mechanical traction therapy	Always
Passive	97016	Vasopneumatic device therapy	Always
Passive	97018	Paraffin bath therapy	Always
Passive	97022	Whirlpool therapy	Always
Passive	97024	Diathermy eg microwave	Always
Passive	97026	Infrared therapy	Always
Passive	97028	Ultraviolet therapy	Always
Passive	97032	Electrical stimulation	Always
Passive	97033	Electric current therapy	Always
Passive	97034	Contrast bath therapy	Always
Passive	97035	Ultrasound therapy	Always
Passive	97036	Hydrotherapy	Always
Passive	97039	Physical therapy treatment	Always
Passive	G0281	Elec stim unattend for press	Always
Passive	G0283	Elec stim other than wound	Always
Passive	G0329	Electromagntic tx for ulcers	Always
Passive	64550	Apply neurostimulator	Sometimes
Passive	0019T	Extracorp shock wv tx ms nos	Sometimes

Table A4c. Type of Therapy HCPCS Code Designation, Allowed

Active, Passive, Allowed	HCPCS	Short Description	Always/Sometimes Therapy
Allowed	92521	Evaluation of speech fluency	Always
Allowed	92522	Evaluate speech production	Always
Allowed	92523	Speech sound lang comprehen	Always
Allowed	92524	Behavral qualit analys voice	Always
Allowed	92597	Oral speech device eval	Always
Allowed	92605	Ex for nonspeech device rx	Always
Allowed	92607	Ex for speech device rx 1hr	Always
Allowed	92608	Ex for speech device rx addl	Always
Allowed	92618	Ex for nonspeech dev rx add	Always
Allowed	96125	Cognitive test by hc pro	Always
Allowed	97001	PT evaluation	Always
Allowed	97002	PT re-evaluation	Always
Allowed	97003	OT evaluation	Always
Allowed	97004	OT re-evaluation	Always
Allowed	97750	Physical performance test	Always
Allowed	97755	Assistive technology assess	Always
Allowed	92610	Evaluate swallowing function	Sometimes
Allowed	92611	Motion fluoroscopy/swallow	Sometimes
Allowed	92612	Endoscopy swallow tst (fees)	Sometimes
Allowed	92614	Laryngoscopic sensory test	Sometimes
Allowed	92616	Fees w/laryngeal sense test	Sometimes
Allowed	95831	Limb muscle testing manual	Sometimes
Allowed	95832	Hand muscle testing manual	Sometimes
Allowed	95833	Body muscle testing manual	Sometimes
Allowed	95834	Body muscle testing manual	Sometimes
Allowed	95851	Range of motion measurements	Sometimes
Allowed	95852	Range of motion measurements	Sometimes
Allowed	96105	Assessment of aphasia	Sometimes
Allowed	96111	Developmental test extend	Sometimes
Allowed	G0451	Devlopment test interpt&rep	Sometimes