

## Brief Report

# USAGE PATTERNS OF SACROILIAC JOINT INJECTIONS - A COMPARATIVE EVALUATION OF PRE AND POST AFFORDABLE CARE ACT IN MEDICARE POPULATION

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**Background:** The sacroiliac joints (SIJ) have been implicated as highly prevalent, pervasive, expensive, causes of chronic low back pain. The utilization of SIJ injections is escalating. A recent analysis demonstrated a reversal of growth of utilization patterns of interventional techniques post passage of the Affordable Care Act (ACA). Bearing that in mind, SIJ injections along with facet joint interventions seem to have increased modestly in that same period.

**Study Design:** Analysis of growth patterns of SIJ injections from 2000 to 2016 with comparative analysis of pre- and post- ACA.

**Objectives:** To assess utilization patterns of SIJ injections from 2000 to 2016.

**Methods:** The Centers for Medicare and Medicaid Services (CMS) Physician/Supplier Procedure Summary (PSPS) Master dataset was utilized in this analysis.

**Results:** The results of the evaluation from 2000 to 2016 showed, 11.7% increase from 2009 to

2016, with an annual increase of 1.6% per 100,000 Medicare population compared to an increase of 299.8% from 2000 to 2009 with annual increase of 16.6%.

**Limitations:** The limitations of this study included a lack of inclusion of Medicare Advantage patients and the possibility that state claims data may include claims from other states. As with all claims based data analyses, this study is retrospective and thus potentially limited by bias. Finally, patients who are self or commercially insured are not part of the dataset.

**Conclusions:** Study shows dampened increase in utilization patterns of SIJ injections from 2009 to 2016 as compared with a like time period prior.

**Key words:** Chronic spinal pain, low back pain, sacroiliac joint arthritis, interventional techniques, interventional pain management, sacroiliac joint injections

Due to continued increases in utilization patterns of various modalities of treatments in managing chronic low back pain, multiple efforts have been made to reduce the escalating use of various interventions (1,2). The Affordable Care Act (ACA) sought to transform healthcare. In the surrounding years, multiple other regulations, including continued efforts to

reform health care in the United States have sought to modify the delivery of care in the U.S. (3-19). Among the many modalities utilized in managing chronic low back pain, interventional techniques and complex surgical interventions take center stage, seemingly despite the utilization of multiple other modalities, most notably extensive use of opioids (1,2,20-29). The ACA and several other regulations were established with 3 primary goals of increasing the number of insured, improving the quality of care, and controlling health care costs (3-8). However, based on extensive evaluation it appears that while the ACA has increased the number of insured it may have decreased coverage for medical services leading to a reduction in access and potentially quality for some (3-8).

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The impact of chronic pain on health care and economy is enormous (1,2,27,28). Dielman et al (1,2) have estimated spending of \$87.6 billion in managing low back and neck pain, accounting for the third highest amount of various disease categories with the dollars spent continuing to increase. Other studies have shown increasing burden of low back pain on health care with chronic disability (1,2,27,28).

Interventional techniques, including sacroiliac joint (SIJ) injections, are one of the commonly utilized modalities of treatments in managing low back pain. There exists debates regarding the appropriateness of utilization, treatment effectiveness and cost utility (10,11,25-27,29-53). A previous assessment of SIJ injections from 2000 to 2014 (26) demonstrated significant increases in utilization patterns from 2000 to 2014 of 316.9%, with an annual increase of 10.7% per 100,000 Medicare population. The increases were constant through 2006 and significant, whereas since 2007 there have been declines in growth. The increases in utilization patterns were higher than epidural injections, but similar to facet joint interventions (26,27). A recent analysis of growth patterns of interventional techniques from 2000 to 2016, with comparative analysis of utilization patterns before and after enactment of ACA demonstrated interesting results with significant decreases for epidural and adhesiolysis procedures, disc procedures and other types of nerve blocks from 2009 to 2016 with slow increase for facet joint interventions and SIJ blocks, with overall decrease in utilization patterns of 3.9% with an annual decline of 0.6% from 2009 to 2016 per 100,000 Medicare population (24,54,55). While it appears that modest rather than explosive growth continues to be present, the comparative analysis prior to and after passage of the ACA has not been performed. This analysis is undertaken to assess utilization patterns of SIJ injections before and after 2009.

## **METHODS**

This assessment was performed with the public use file with non-identifiable, which is non-attributable, and non-confidential, available through Centers for Medicare and Medicaid Services (CMS) database (56). The study was performed using Strengthening the Reporting of Observational Studies (STROBE) in

epidemiology guidance (57), without seeking approval from the Institutional Review Board.

## **STUDY DESIGN**

This assessment was designed to evaluate usage or utilization patterns and variables of SIJ injections from 2000 to 2016 in the Medicare fee-for-service (FFS) population in the United States.

## **SETTING**

The National Database of Speciality Usage Data files from CMS in the FFS Medicare population in the United States (56).

## **Participants**

The data from all the participants from the database of FFS Medicare recipients were utilized from 2000 to 2016.

## **Variables**

Multiple variables were assessed including usage patterns of SIJ injections from 2000 to 2016, from 2000 to 2009, and 2009 to 2016.

The Current Procedural Terminology (CPT) code for SIJ injections (CPT 20670 and G20670 for physician, hospital outpatient department (HOPD), and ambulatory surgery center (ASC) was utilized which has been in effect during the study period.

The data were also assessed based on the place of service identifying HOPD, ASC, and a non-facility setting or office setting.

## **Data Sources**

The analyzed data were obtained from the CMS Physician/Supplier Procedure Summary Master Data file from 2000 to 2016 (56). These data consisted of all FFS Medicare participants.

## **Measures**

The usage pattern analysis included all allowed services configured by taking services submitted minus services denied and services with zero payments. The rate was calculated per 100,000 Medicare beneficiaries.

## Bias

The American Society of Interventional Pain Physicians (ASIPP) a not-for-profit organization, purchased the data. The study was also conducted with the internal resources of the primary authors' practice without external funding.

## Study Size

The study size is large with inclusion of all patients under Medicare FFS undergoing SIJ injections in all settings from 2000 to 2016.

## Data Compilation

The data was compiled by using Microsoft Access 2010 and Microsoft Excel 2010 (Microsoft Corporation, Redmond, Virginia).

## RESULTS

### Participants

Participants in this assessment included all FFS Medicare recipients from 2000 to 2016.

### Utilization Characteristic

Table 1 shows frequency of SIJ injections in Medicare population from 2000 to 2016 with comparative data from 2000 to 2009 and 2009 to 2016. Comparative analysis showed SIJ injections increased 299.8% from 2000 to 2009 with an annual increase of 16.6%, whereas the increases were milder per 100,000 Medicare population from 2009 to 2016 with total increase of 11.7% and an annual increase of 1.6%.

Figure 1 shows relative declines of various interventional techniques compared to SIJ blocks with comparison of lumbar facet joint blocks, lumbar epidural injections, disc procedures and other types of nerve blocks, in comparison to all interventional techniques.

### Utilization Characteristic by State

Utilization characteristics in various states was analyzed based on Medicare Administrative Contractors (MACs) jurisdictions.

As shown in Table 2, based on MACs jurisdictions from 2009 to 2016, First Coast Services covering Florida and Cahaba covering Alabama, Georgia, Tennessee showed 1% and 1.4% reductions in utilization per year with a total of 7% and 9% decrease

overall. All other carriers showed increases ranging from 1.5% for WPS, 2.3% for Palmetto, 2.8% for CGS, 3.2% for Novitas, 3.3% for NGS, and, finally, the highest increases noted for Noridian with 4.3% annually or 34% from 2009 to 2016. Noridian led policies removed Local Coverage Determination (LCD) for SIJ injections (58-60). The increases are similar to other procedures, which have shown higher rates of increases or lower rates of declines in Noridian states compared to others (24-27), except for adhesiolysis (55), wherein Noridian led the noncoverage policy. The data also showed major increases in Noridian states as high as 21.1% for Alaska, 9.8% for Wyoming, 8.9% for North Dakota, 8.1% for Utah, 8% for Oregon, and 7% for Arizona. Only one Noridian state – Montana, showed a decline of 2.2%. Multiple other states also showed increases in other MACs with over 6% including the states of Connecticut, Delaware, Oklahoma, Colorado, Maine, Massachusetts and District of Columbia. The majority of the declines were observed in Tennessee, Rhode Island, with minor declines in New Hampshire, Montana, and Florida. The assessment of usage patterns of SIJ injections from 2000 to 2009 showed escalating usage with annual increases of 16.6% and overall increase of 299%, whereas from 2009 to 2016, overall increases were 11.7% with an annual increase of 1.6% per 100,000 Medicare population. Overall, the study showed dampened increase in utilization patterns of SIJ injections from 2009 to 2016.

## DISCUSSION

The comparative assessment of utilization data of SIJ injections for low back and lower extremity pain in Medicare FFS population from 2000 to 2016 showed dramatic shifts from 2009 to 2016 after enactment of ACA and other regulations as compared with the period of 2000 to 2009. The data shows that there was a significant increase of utilization of SIJ injections from 2000 to 2009 with 299.8% per 100,000 Medicare population with annual increase of 16.6%, which was described as an explosive increase, but with modest growth from 2009 to 2016 with total increase of 11.7% and at an annual increase of 1.6%. Consequently, while SIJs still show continuing increase in utilization, it is notably below growth of elderly population of annual growth of 3.2% and Medicare participants of 3%.

Table 1. Characteristics of Medicare beneficiaries and sacroiliac joint injections from 2000 to 2016.

	U.S. Population			Medicare Beneficiaries				SIJ Injections			
	Total Population (,000)	≥ 65 Years (,000)		Number (,000)	% to U.S. population	≥ 65 years (,000) (Percent)	< 65 years (,000) (Percent)	Services*	% of Change From Previous Year	Rate per 100,000 Medicare Beneficiaries	% of Change From Previous Year
		Number	Percent								
2000	282,172	35,077	12.4%	39,632	14.0%	34,262 (86.5%)	5,370 (13.5%)	49,554 (59%)	NA	125	NA
2001	285,040	35,332	12.4%	40,045	14.0%	34,478 (86.1%)	5,567 (13.9%)	85,664 (41%)	72.9%	214	71.1%
2002	288,369	35,605	12.3%	40,503	14.0%	34,698 (85.7%)	5,805 (14.3%)	101,749 (48%)	18.8%	251	17.4%
2003	290,211	35,952	12.4%	41,126	14.2%	35,050 (85.2%)	6,078 (14.8%)	128,864 (42%)	26.6%	313	24.7%
2004	292,892	36,302	12.4%	41,729	14.2%	35,328 (84.7%)	6,402 (15.3%)	172,704 (41%)	34.0%	414	32.1%
2005	295,561	36,752	12.4%	42,496	14.4%	35,777 (84.2%)	6,723 (15.8%)	188,606 (42%)	9.2%	444	7.2%
2006	299,395	37,264	12.4%	43,339	14.5%	36,317 (83.8%)	7,022 (16.2%)	211,928 (40%)	12.4%	489	10.2%
2007	301,290	37,942	12.6%	44,263	14.7%	36,966 (83.5%)	7,297 (16.5%)	213,489 (41%)	0.7%	482	-1.4%
2008	304,056	38,870	12.8%	45,412	14.9%	37,896 (83.4%)	7,516 (16.6%)	228,687 (42%)	7.1%	504	4.4%
2009	307,006	39,570	12.9%	45,801	14.9%	38,177 (83.4%)	7,624 (16.6%)	228,946 (42%)	0.1%	500	-0.7%
2010	308,746	40,268	13.0%	46,914	15.2%	38,991 (83.1%)	7,923 (16.9%)	237,905 (42%)	3.9%	507	1.4%
2011	311,583	41,370	13.3%	48,300	15.5%	40,000 (82.8%)	8,300 (17.2%)	252,654 (43%)	6.2%	523	3.2%
2012	313,874	43,144	13.8%	50,300	16.0%	41,900 (83.3%)	8,500 (16.9%)	266,764	5.6%	530	1.4%
2013	316,129	44,704	14.1%	51,900	16.4%	43,100 (83.0%)	8,800 (17.0%)	266,643	0.0%	514	-3.1%
2014	318,892	46,179	14.5%	53,500	16.8%	44,600 (83.4%)	8,900 (16.5%)	278,866	4.6%	521	1.5%
Y2015	320,897	47,734	14.88%	54,900	17.1%	46,000 (83.8%)	9,000 (16.4%)	296,997	6.5%	541	3.8%

Table 1 cont. Characteristics of Medicare beneficiaries and sacroiliac joint injections from 2000 to 2016.

	U.S. Population			Medicare Beneficiaries				SIJ Injections			
	Total Population (,000)	≥ 65 Years (,000)		Number (,000)	% to U.S. population	≥ 65 years (,000) (Percent)	< 65 years (,000) (Percent)	Services*	% of Change From Previous Year	Rate per 100,000 Medicare Beneficiaries	% of Change From Previous Year
		Number	Percent								
Y2016	323,127	49,244	15.24%	56,500	17.5%	47,500 (84.1%)	9,000 (15.9%)	315,480	6.2%	558	3.2%
2000-2016	14.5%	40.4%		42.6%		38.6%	67.6%	536.6%		346.6%	
GM	0.9%	2.1%		2.2%		2.1%	3.3%	12.3%		9.8%	
2000-2009	8.8%	12.8%		15.6%		11.4%	42.0%	362.0%		299.8%	
GM	0.9%	1.3%		1.6%		1.2%	4.0%	18.5%		16.6%	
2009-2016	5.3%	24.4%		23.4%		24.4%	18.0%	37.8%		11.7%	
GM	0.7%	3.2%		3.0%		3.2%	2.4%	4.7%		1.6%	

GM - Geometric average annual change. ( ) facility percentage

These growth patterns are similar in earlier years compared to the previous publications; however, there is a significant reversal of growth patterns even though there is no net decline from 2009 to 2016. However, while the increases appear to be similar to facet joint interventions during these periods they contrast with decreases of epidural and adhesiolysis procedures as well as disc procedures and other types of nerve blocks (24,54) as shown in Fig. 1.

Multiple LCDs were spearheaded by Noridian presumably at least in part to diminish utilization. Noridian did not put a specific policy for SIJ injections into place. Despite the LCDs, Noridian states increased SIJ injections utilization of 4.3% annually compared to a national rate of 3.2% from 2009 to 2016 (58-60). In fact, other MACs that do not utilize Noridian policies have shown smaller increases or decreases of utilization of SIJ injections; 2.8% for CGS and reduction in 1% for First Coast Services. Only one MAC showed decline in usage patterns with 1.4% annual, for Cahaba, mainly based on decline in utilization of SIJ injections from Tennessee. In addition, statewide data also showed extensive increases at an annual rate of 21.1% for Alaska, 9.8% for Wyoming, 8.9% for North Dakota, 8.1% for Utah, 8% for Oregon, 7% for Arizona, 5.9% for Idaho, and 4.7% for Nevada. The price changes with fluctuating reimbursement pattern starting in 2014 with significant reductions in payments and also bundling of fluoroscopy into the procedure have contributed in decline (11,12,61-63). In 2009, the stimulus act initiated multiple regulations and a focus on decreasing utilization with increasing regulatory aspects (64). In addition, as compared with prior eras, there was exceptional expansion of regulatory atmosphere with enactment of multiple other regulations of quality performance, meaningful use, and cost reductions (3-19). Further, multiple changes related to code definition, lack of LCDs resulting in non-coverage policies, concurrent with reduction of reimbursement have influenced utilization patterns. These changes can have the impact of reducing access for Medicare and other beneficiaries (3,8,11,12,24-27,65,66).

SIJ injections are controversial with respect to appropriate utilization, overuse, misuse, abuse, fraud, coupled with claims of lack of evidence of effectiveness, medical necessity, and indications (44). Any treatment requires proper utilization with appropriate use with determination of medical necessity and indications (60). Beyond

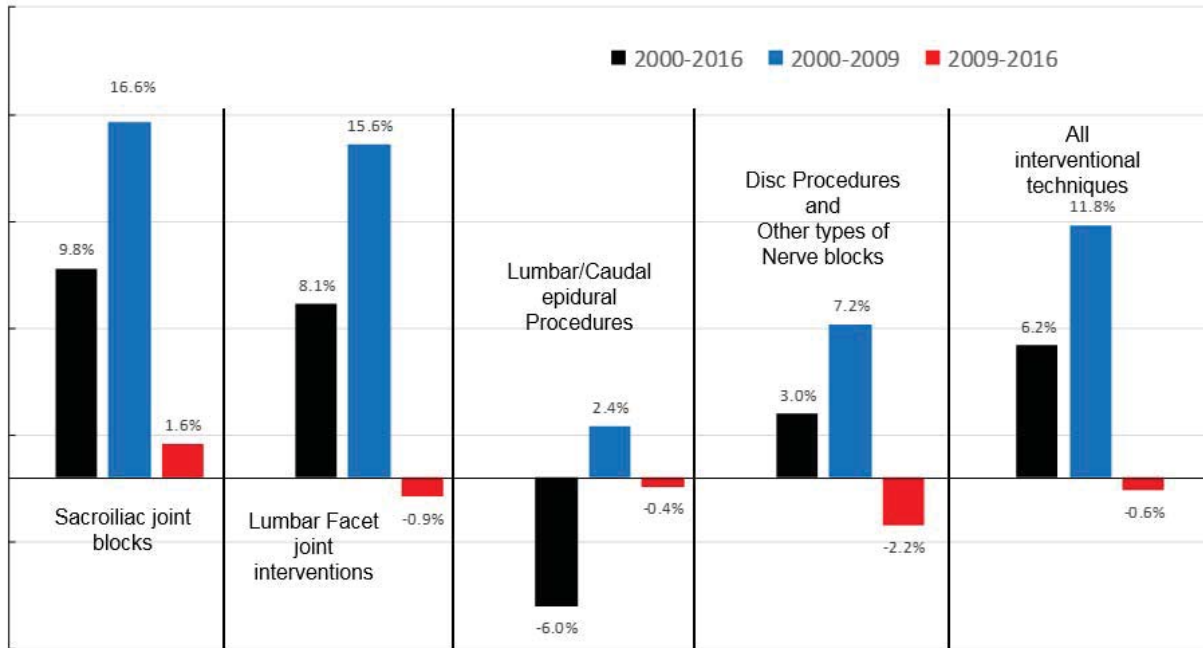


Fig. 1. Comparative analysis of sacroiliac joint blocks, lumbar facet joint interventions, lumbar/caudal epidural procedures, disc procedures and other types of nerve blocks, all interventional techniques annual change.

Table 2. Utilization of sacroiliac joint intervention rates by 2016 Medicare Carrier from 2009-2016 in Medicare population.

2016 Medicare Carrier	State	R2009	R2010	R2011	R2012	R2013	R2014	R2015	R2016	Change	GM
Cahaba	Alabama	617	836	809	850	745	695	768	805	30%	3.9%
	Georgia	716	669	803	812	676	691	735	789	10%	1.4%
	Tennessee	895	900	1101	845	568	455	417	448	-50%	-9.4%
	Cahaba Total	750	792	905	833	658	613	637	680	-9%	-1.4%
CGS	Kentucky	783	865	845	925	948	1071	1017	1139	46%	5.5%
	Ohio	557	535	513	537	541	574	566	598	7%	1.0%
	CGS Total	621	630	608	648	659	717	695	753	21%	2.8%
First Coast	Florida	867	792	806	789	741	729	772	807	-7%	-1.0%
NGS	Connecticut	290	287	368	459	504	530	558	570	97%	10.1%
	Illinois	386	402	366	427	425	431	482	492	27%	3.5%
	Maine	300	337	354	456	541	450	535	471	57%	6.6%
	Massachusetts	353	401	453	494	482	491	500	531	50%	6.0%
	Minnesota	276	324	315	330	307	284	287	321	16%	2.2%
	New Hampshire	637	654	662	720	659	672	610	539	-15%	-2.3%
	New York	250	206	223	261	296	315	359	315	26%	3.3%

## Usage Patterns of SIJ Injections- Pre and Post ACA

2016 Medicare Carrier	State	R2009	R2010	R2011	R2012	R2013	R2014	R2015	R2016	Change	GM
	Rhode Island	1173	1217	1194	1012	852	801	771	689	-41%	-7.3%
	Vermont	337	385	400	400	416	454	497	476	41%	5.0%
	Wisconsin	438	454	460	501	526	449	465	515	18%	2.3%
	NGS Total	345	348	358	400	412	409	440	434	26%	3.3%
Noridian	Alaska	139	135	180	271	268	270	861	531	282%	21.1%
	Arizona	408	441	441	498	577	643	617	657	61%	7.0%
	California	285	299	290	293	280	303	327	327	14%	1.9%
	Idaho	414	391	419	469	474	568	607	618	49%	5.9%
	Montana	343	264	305	284	268	267	244	293	-14%	-2.2%
	Nevada	390	401	456	443	485	468	526	537	37%	4.7%
	North Dakota	474	547	526	651	773	874	833	861	82%	8.9%
	Oregon	215	239	261	283	288	369	402	369	72%	8.0%
	South Dakota	1001	997	1074	1152	1127	1179	1203	1290	29%	3.7%
	Utah	588	660	685	787	708	818	941	1013	72%	8.1%
	Washington	225	217	226	214	266	262	298	309	37%	4.6%
	Wyoming	266	262	289	324	434	457	542	511	92%	9.8%
	Noridian Total	318	331	335	350	360	393	422	426	34%	4.3%
Novitas	Arkansas	543	469	449	470	506	530	608	618	14%	1.9%
	Colorado	337	352	383	435	464	502	518	556	65%	7.4%
	DC	1669	1639	1795	2031	2695	3017	3452	3430	106%	10.8%
	Delaware	297	289	486	571	704	675	640	548	85%	9.1%
	Louisiana	303	281	291	291	345	319	363	386	27%	3.5%
	Maryland	404	387	376	442	509	517	545	511	26%	3.4%
	Mississippi	592	553	507	507	572	575	677	725	23%	3.0%
	New Jersey	345	349	359	379	421	423	437	461	34%	4.2%
	New Mexico	304	291	327	374	392	367	364	339	11%	1.6%
	Oklahoma	341	313	438	499	477	493	620	613	79%	8.7%
	Pennsylvania	295	316	316	318	349	377	374	390	32%	4.0%
	Texas	566	505	526	520	502	542	574	573	1%	0.2%
	Novitas Total	424	404	422	439	465	486	520	530	25%	3.2%
Palmetto GBA	North Carolina	613	618	673	736	716	717	759	795	30%	3.8%
	South Carolina	708	803	988	1051	1034	961	809	777	10%	1.3%
	Virginia	563	584	650	571	544	607	638	626	11%	1.5%
	West Virginia	491	429	428	411	424	400	379	476	-3%	-0.5%
	Palmetto Total	605	626	706	719	704	706	699	711	17%	2.3%
WPS	Indiana	616	707	800	844	735	796	783	814	32%	4.1%
	Iowa	394	431	435	507	517	514	507	577	46%	5.6%
	Kansas	550	651	660	637	623	643	657	633	15%	2.0%
	Michigan	836	1025	891	997	919	789	784	798	-5%	-0.7%
	Missouri	865	850	868	885	908	922	909	934	8%	1.1%
	Nebraska	563	578	539	610	702	878	627	704	25%	3.2%
	WPS Total	709	802	779	838	799	781	761	786	11%	1.5%

that, there is emerging evidence for appropriate diagnosis and treatment of SIJ pain (37-43).

This analysis reconfirms the well-known fact that there have been increases in elderly and Medicare populations. Perhaps less well known, this analysis indicates that there was a decrease in the rate patients enrolled in Medicare with disabilities pre- and post- the ACA. There was an annual growth rate of 2.4% from 2009 to 2016 as compared with an annual growth rate was 4% from 2000 to 2009. This suggests that individuals with disability are being enrolled in Medicaid instead of Medicare post- Medicaid expansion (67,68).

Declining rate of utilization of interventional pain management procedures may be considered as a contributing factor to escalating opioid epidemic (28,46,54,69-72). Multiple attempts have been made from administration officials to curtail the opioid epidemic with promotion of nonopioid interventional techniques (28,46,69-72); however, in contrast to the public perceptions and perceived policies, we believe that the present policies continue to promote the decline of non-opioid techniques (28,30-53).

Limitations of this assessment include lack of inclusion of Medicare Advantage Plans, which

constitute approximately 30% of the population, self and commercially insured plans. However, the present assessment also is expected to apply to Medicare Advantage Plans and other carriers with enhanced implementation of reduction strategies. As with all claims based data reviews, this analysis is retrospective and thus could be influenced by reviewer bias.

## CONCLUSION

The assessment of usage patterns of SIJ blocks from 2000 to 2016 showed a trend with decrease in the rate of increase of utilization from 2009 to 2016. From 2009-2016 there was an annual increase of 1.6% per 100,000 Medicare population, compared to an annual increase of 16.6% from 2000 to 2009. Multiple factors have been attributed to changes in utilization patterns.

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