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Muench, Ulrike, Jennifer Perloff, Cindy Parks Thomas, and Peter I. Buerhaus. "Prescribing Practices by Nurse Practitioners and Primary Care Physicians: A Descriptive Analysis of Medicare Beneficiaries." Journal of nursing regulation 8, no. 1 (April 2017): 21-30.

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Prescribing Practices by Nurse Practitioners and Primary Care Physicians: A Descriptive Analysis of Medicare Beneficiaries

Ulrike Muench, RN, PhD; Jennifer Perloff, PhD; Cindy Parks Thomas, PhD; and Peter I. Buerhaus, RN, PhD

Introduction: Nurse practitioner (NP) prescribing continues to be a contentious policy issue, and studies systematically examining NP prescribing are lacking. The aim of this study was to conduct a descriptive analysis comparing the prescribing services of NPs with those of primary care physicians (PCPs) in providing care to Medicare beneficiaries. **Methods:** Part D drug claims of beneficiaries who saw an NP or a PCP in 2009 and 2010 were examined for differences in the types of medications prescribed, the volume of prescriptions, and the duration of prescriptions across all drug classes in Medicare Part D. **Results:** Data for 164,681 beneficiaries were analyzed. Results showed the same top 20 types of medications and the same share of generic medications for NP and PCP prescriptions. Differences in prescribing patterns were found for the number of prescriptions and for the duration of the prescriptions (days' supply per claim). NP beneficiaries received, on average, approximately one more 30-day prescription per year than PCP beneficiaries. The mean duration for an NP prescription claim was 3 days shorter than that for a PCP prescription claim, indicating that NP beneficiaries need refills sooner than PCP beneficiaries. This pattern existed in most drug classes and was more pronounced in behavioral drug classes, such as antidepressants, antipsychotics, psychotherapeutics, and opioids and in patients with more comorbidities. Differences in state scope of practice laws did not affect these prescribing patterns. **Conclusions:** Key differences were observed in the number and duration of prescriptions written by NPs and PCPs. Further research is needed to understand the impact of differences in NP and PCP patient populations on provider prescribing, such as the higher number of prescriptions issued by NPs for beneficiaries in moderate and high comorbidity groups and the implications of the duration of prescriptions for clinical outcomes, patient-provider rapport, costs, and potential gaps in medication coverage.

Keywords: Nurse practitioners, prescribing patterns, primary care physicians, research

Shortages of physicians have been forecasted for primary care and specialty areas (IHS Inc, 2015). These shortages are particularly worrisome because nearly 80 million baby boomers will become eligible for Medicare over the next two decades, many of whom suffer from several comorbidities and degenerative diseases that will challenge the capacity of the Medicare program. Additionally, private, state, and federal efforts to increase access to care have resulted in approximately 20 million individuals gaining insurance coverage, and another 10 million or more are expected in the coming years. Thus, policymakers have become increasingly supportive of expanding the numbers, roles, and productive capacity of the primary care nurse practitioner (NP) workforce.

A growing body of research has established that NPs provide similar and, in some cases, superior care compared with primary care physicians (PCPs) (Lenz, Mundinger, Kane, Hopkins, & Lin, 2004; Mundinger et al., 2000; Naylor et al., 2004; Newhouse et al., 2011; Venning, Durie, Roland, Roberts, & Leese, 2000), and

a recent national study of Medicare beneficiaries showed that the cost of primary care provided by NPs is substantially lower than care provided by PCPs (Perloff, DesRoches, & Buerhaus, 2015). Yet, little is known about the medication prescribing practices of NPs (Lenz, Mundinger, Hopkins, Lin, & Smolowitz, 2002; Shell, 2001). Prescription drug costs have increased sharply in recent years, including Medicare prescription drug costs (Sarpawari, Avorn, & Kesselheim, 2016), refocusing conversations on provider prescribing patterns and choices (DeJong et al., 2016). Concerns over the volume and costs of behavioral health medications and controlled substances have surfaced (Roehrig, 2016), highlighting the importance of assessing the prescribing practices of primary care providers at the forefront of managing behavioral health conditions (Hercelinskyj, Cruickshank, Brown, & Phillips, 2014). Understanding how prescribing services differ between NPs and PCPs will help inform state and federal policymakers concerned

with expanding the primary care workforce and curbing prescription drug costs (Sarpatwari, Avorn, & Kesselheim, 2016).

This study made use of a representative sample of Medicare beneficiaries, allowing for a nationwide assessment of services provided by NPs and PCPs. The aims were to provide an overview of the types and volumes of medications prescribed by NPs and PCPs and to explore their prescribing patterns.

To examine medication use of Medicare beneficiaries, the authors analyzed data from Medicare Part D, the prescription drug coverage program for those covered under Medicare A or B. Drug coverage varies substantially among different Part D insurance plans, with differences in deductibles and coinsurance. Because little is known about NP prescribing services in Medicare data, the authors also examined whether three Medicare Part D coverage phases—initial benefit phase, coverage gap phase (also called the donut hole), and the catastrophic coverage phase—differ for beneficiaries receiving care from NPs versus PCPs.

Methods

This study was a retrospective descriptive analysis of prescription drug claims in a cohort of Medicare beneficiaries who received care by NPs and PCPs with national provider identification (NPI) numbers in 2009 and 2010. Institutional review board approval was obtained from research ethics boards at Vanderbilt University and the University of California San Francisco.

A prescription claim is a billing record registered in the Part D data system and indicates a new prescription or refill. The authors used the Medi-span proprietary therapeutic classification system (TCS) to quantify Part D claims and prescriptions for drug groups at different levels of aggregation, allowing identification of the top 20 drug classes, or up to 536 drug groupings. To examine prescribing practices, the authors focused on two key concepts in prescribing: the mean number of prescriptions and the duration of prescriptions. For example, for a medication to be taken continuously, one provider may give a patient a 90-day supply of a single prescription, and another may prescribe the same medication in three 30-day prescriptions. In analyzing the data, the authors observed the first as one claim and the latter as three claims, respectively.

An underlying assumption is that a systematic difference in the duration of a prescription may affect patient outcomes. For example, differences in prescription duration may have clinical implications because the patient needs to act to obtain refills or a new prescription to take medications continuously. This action may consist of a phone call or a message in an online portal, or it may be more involved, requiring a visit to the provider. At a minimum, a trip to the pharmacy to obtain the medication is required. Thus, a shorter duration could provide an opportunity for an important phone or in-person check-up, or it could lead to an unnecessary gap in medication coverage.

Data

The core analysis is based on beneficiaries' 2010 Medicare Part D data. The authors also used the beneficiary summary file to obtain beneficiary enrollment information in Part A, B, and D and dual Medicaid-Medicare eligibility status. In addition, the authors used Part B data to measure how the NP and PCP cohorts differed by clinical severity based on the Elixhauser comorbid conditions classification (Elixhauser, Steiner, Harris, & Coffey, 1998). Because Medicare Part D claims do not include information on the drug class, the authors used data from Medi-span to categorize medications based on the National Drug Code.

Sample

The sampling strategy follows closely the work of Perloff and colleagues (2015). Beneficiaries were identified based on a random sample of NPs (specialty code "50") and PCPs (specialty code 08 = family medicine and 11 = internal medicine). The sampling goal was to draw a cohort of approximately 1 million beneficiaries of NP and PCPs. The sample included 9,422 NP providers and 68,069 PCPs, representing approximately 80% of all Medicare NP providers and approximately 20% of all PCPs who offer services to Medicare beneficiaries. The authors purposefully oversampled beneficiaries who saw NPs to achieve adequate representation of NP services in the data because NPs see approximately half as many Medicare beneficiaries as PCPs (Perloff et al., 2015). The authors obtained all Part A, B, and D claims for the year 2010 from these beneficiaries, which resulted in a large number of claims belonging to both NPs and PCPs, as well as to other clinicians not in primary care, such as physician specialists.

Figure 1 illustrates the sample selection process. From the beneficiaries assigned to NPs or PCPs, (explained below) the authors selected those who had continuous enrollment in Part A, B, and D; did not switch prescription plans during the year; filled at least one prescription; and had no missing data in the demographic variables. For beneficiaries who died during 2010, the authors excluded their prescription claims from 6 months before their death because the goal was to capture the prescription profile of a typical primary care population. This decision was based on the rationale that major health changes likely take place before the end of life, possibly resulting in prescription drug changes. Finally, patients under 65 years of age were excluded from the analysis, as younger dual eligibles may have clinical profiles that are different than the rest of the Medicare population.

Attribution

To examine differences in services by NPs and PCPs, the authors assigned each beneficiary to a single provider type. The authors used the beneficiaries' total evaluation and management (E&M) expenditures over a 12-month period to determine which provider was associated with the highest beneficiary expenditures and limited the E&M expenditures to those identifiable as primary care: Berenson-Eggers Type of Service Codes for established office visit

(M1B: 99211-99215), home visit (M4A: 99340-99345; 99347-99350), or nursing home visit (M4B: 99404-99306; 99307-99310) (Perloff et al., 2015). Limiting attribution to claims from E&M services from primary care service codes helps ensure that the clinicians in this study are providing substantial primary care services to Medicare beneficiaries.

Attribution of beneficiaries to NPs and PCPs was carried out in three steps. First, the authors calculated the proportion of primary care E&M paid amounts for each beneficiary for each clinician in the 2009 data. Second, the beneficiary was assigned to the primary care clinician with the highest proportion of primary care E&M costs. Third, to ensure a strong relationship between beneficiaries and primary care clinicians, the authors limited the sample to beneficiaries who received at least 30% of their services from one clinician. If two clinicians were associated with the same E&M paid amounts, one clinician was selected at random.

Variables

To identify whether differences existed in the types of medications prescribed by NPs and PCPs, Medi-span's TCS was applied. This system provides a crosswalk of National Drug Codes to drug classes at different levels of granularity. Using the TCS, the authors identified the 20 most frequently prescribed medication classes in the data.

To measure the quantity of medications prescribed, the authors calculated the number of prescriptions filled in 2010 by standardizing prescription drug claims to a 30-day supply, as is standard in the literature (Medicare Payment Advisory Commission, 2015). "Days' supply" is a data field filled out by pharmacists, and 30-day supply was obtained by dividing by 30 the number of days for which a medication was prescribed. For example, a 45-days supply on one prescription claim counted as 1.5 prescriptions.

Prescribing Practices

To discern the differences in provider prescribing patterns, the authors examined the relationships among number of prescriptions, number of claims, and days' supply using Medi-span's most granular TCS, categorizing medications into 536 drug groups.

Drug categories with fewer than 10 beneficiaries for NPs were not included to ensure adequate beneficiary representation in all drug categories. The resulting 307 drug groups were highly specific. For example, antidepressant drug group included alpha-2 receptor antagonists (tetracyclics), monoamine oxidase inhibitors, serotonin modulators, selective serotonin reuptake inhibitors, tricyclic agents, miscellaneous antidepressants, and antidepressant combination products. Comparing prescribing behaviors of clinicians in specific medication groups helps control for clinical differences among patients for which these medications are indicated.

The goals were to examine if differences in the number of prescriptions persisted in specific drug groups and to identify if NPs and PCPs write prescriptions for longer or shorter durations,

FIGURE 1
Sample Selection Flow Diagram of Medicare Beneficiaries Receiving Care from Nurse Practitioners (NPs) and Primary Care Physicians (PCPs)

thus providing insight into whether patients seen by NPs and PCPs interact more or less often with the health care system for their prescription needs.

Brand and Generic Medications

The authors used the Medi-span brand and generic indicator variable to calculate the share of brand generic medications by NPs and PCPs.

Comorbidity Adjustment of Clinical Severity

Medicare administrative Part B claims include information on beneficiaries' pre-existing conditions in the form of diagnoses codes. The authors used this information and the Elixhauser comorbid conditions classification (Elixhauser et al., 1998), an algorithm that groups diagnoses codes into 30 comorbidities, to create three comorbidity groups of low, moderate, and high clinical severity: 0 to 3 comorbidities, 4 to 6 comorbidities, and more than 6 comorbidities.

TABLE 1

Sample Characteristics of Beneficiaries by Provider Type

Variable	NP (%)	PCP (%)	<i>p</i> value
Demographics			
White	82	87	< .001
Mean age (years)	77.53	78.05	< .001
Female	72	67	< .001
Dual eligibility for Medicare/Medicaid	46	31	< .001
Rural	5	3	< .001
CMS region			
Region 1	4	5	< .001
Region 2	8	13	< .001
Region 3	30	27	< .001
Region 4	16	20	< .001
Region 5	13	8	< .001
Region 6	9	7	< .001
Region 7	3	2	< .001
Region 8	4	6	< .001
Region 9	6	4	< .001
Elixhauser Comorbidities			
Valve disorder	12	17	< .001
Pulmonary circulation disease	3	5	< .001
Peripheral vascular disease	23	24	.002
Hypertension	84	87	< .001
Complex hypertension	5	5	.020
Paralysis	4	3	< .001
Other neurologic disorders	19	17	< .001
Chronic pulmonary disease	24	26	< .001
Diabetes without chronic complications	44	43	.448
Diabetes with chronic complications	17	18	.005
Hypothyroidism	22	24	.001
Renal failure	12	13	.001
Liver disease	2	2	.005
Peptic ulcer disease and bleeding	0	0	.400
Acquired immune deficiency syndrome	0	0	< .001
Lymphoma	1	1	< .001
Metastatic cancer	1	1	.001
Solid tumor without metastasis	7	11	< .001
Rheumatoid arthritis/collagen vas	4	6	< .001
Coagulopathy	4	5	< .001
Obesity	8	8	.101
Weight loss	6	6	.045
Fluid and electrolyte disorders	16	18	< .001
Chronic blood loss anemia	26	27	.001
Alcohol abuse	1	1	.236
Drug abuse	1	1	.762
Psychoses	13	11	< .001
Depression	18	15	< .001
Elixhauser Comorbidity Groups			
0–3 Comorbidities	20	17	< .001
4–6 Comorbidities	42	43	< .001
> 6 Comorbidities	38	39	< .001

Note. CMS = Centers for Medicaid and Medicare Services; NP = nurse practitioner; PCP = primary care physician.

Statistical Analysis

The authors conducted a descriptive analysis of beneficiaries and their prescription claims by provider type. When examining the number of prescriptions for the most common drug classes, the authors added the number of comorbidities of beneficiaries as another grouping variable to account for differences in illness severity in NP and PCP beneficiaries. This resulted in subanalyses by the three comorbidity groups. The authors tested for bivariate associations using *t* tests and chi-square analyses for continuous and categorical data as appropriate to identify differences among providers on the study's prescribing outcomes of interest at a statistical significance level of $p < .05$. The number of prescriptions was skewed, and the authors used a Kruskal-Wallis nonparametric test for non-normally distributed data.

Results**Sample Selection**

The analytic sample consisted of 164,681 beneficiaries; 18% ($n = 30,326$) were assigned to NPs, and 82% were assigned to PCPs ($n = 134,355$). According to the sample criteria, these beneficiaries were continuously enrolled in Medicare Part A, B, and D; did not switch prescription drug plans during 2010; had no missing demographic information; were aged 65 years or older; and had at least one prescription in 2010. Figure 1 depicts how each step in the sample selection process affected the sample size for NP and PCP beneficiaries.

A larger share of NP beneficiaries was covered under Part D (63% NP beneficiaries vs. 55.4% PCP beneficiaries), indicating that NP beneficiaries use full Medicare benefits at a higher rate. Applying the minimum age criteria of 65 years resulted in a larger percentage of NP beneficiaries than PCP beneficiaries being dropped from the sample. This decrease likely results from the higher share of the dual Medicare-Medicaid-eligible population younger than 65 years seen by NPs.

Beneficiary Characteristics

Beneficiaries assigned to NPs were significantly more likely to be nonwhite, younger, female, dually eligible for Medicare and Medicaid, and living in rural areas ($p < .001$) (See Table 1). They were also statistically significantly less likely to have each of the Elixhauser comorbid conditions except paralysis, neurological disorder, AIDS, weight loss, alcohol abuse, drug abuse, and psychoses. Examining the number of comorbidities showed that a greater share of NP beneficiaries was in the lowest comorbidity group, suggesting that beneficiaries assigned to NPs maybe somewhat healthier than PCP beneficiaries. Beneficiaries assigned to NPs were significantly more likely to reach the later Part D coverage phases that are associated with high prescription costs (coverage gap phase: NPs 41% vs. PCPs 36%; catastrophic phase: NPs 14.6% vs. PCPs 10.1%).

TABLE 2

Total Number of Prescriptions and Average Number of Prescriptions Per Beneficiary for 20 Most Common Drug Classes

	Total Number of Prescriptions					Average Number of Prescriptions per Beneficiary		
	NP		PCP			NP	PCP	
Drug Group	Number	%	Number	%	<i>p</i> value ^a	Number	Number	<i>p</i> value ^b
Antihypertensives	175,860	9.71	831,848	10.52	< .001	10.72	10.67	.017
Antihyperlipidemics	150,143	8.29	773,218	9.78	< .001	10.08	10.12	.767
Beta-blockers	119,215	6.59	589,950	7.46	< .001	9.75	9.54	< .001
Diuretics	118,965	6.57	523,428	6.62	.021	9.45	9.12	< .001
Antidiabetics	110,942	6.13	481,413	6.09	.038	14.2	13.87	< .001
Antidepressants	138,746	7.66	480,710	6.08	< .001	11.1	10.1	< .001
Ulcer drugs	97,062	5.36	436,466	5.52	< .001	8.39	8.14	< .001
Calcium channel blockers	78,125	4.32	381,995	4.83	< .001	9.46	9.26	< .001
Thyroid agents	74,885	4.14	331,083	4.19	.002	10.59	10.47	< .001
Analgesics, opioids	56,711	3.13	220,121	2.78	< .001	4.44	3.68	< .001
Anticonvulsants	57,003	3.15	197,533	2.5	< .001	9.83	8.45	< .001
Antiasthmatics	44,856	2.48	196,461	2.48	.617	6.66	6.91	< .001
Minerals	45,480	2.51	180,113	2.28	< .001	7.44	7.12	< .001
Psychotherapeutic agents	69,774	3.85	180,050	2.28	< .001	12.59	11.01	< .001
Anticoagulants	36,765	2.03	179,968	2.28	< .001	9.98	8.57	< .001
Hematologic agents	33,212	1.83	163,905	2.07	< .001	9.02	8.55	< .001
Endocrine-metabolic agents	32,697	1.81	159,131	2.01	< .001	7.92	7.82	.222
Ophthalmic agents	29,490	1.63	131,788	1.67	< .001	4.69	4.51	.597
Antipsychotics	51,889	2.87	118,273	1.5	< .001	10.44	8.56	< .001
Anti-inflammatories	23,645	1.31	113,471	1.43	< .001	4.66	4.36	< .001
Other	264,866	14.63	1,237,440	15.65	< .001	9.93	10.24	< .001
Total	1,810,331		7,908,365			59.7	58.9	

Note. NP = nurse practitioner; PCP = primary care physician. The number of prescriptions is standardized to a 30-day supply.

^a Pearson chi-square test.

^b Kruskal-Wallis nonparametric test.

Prescribing Characteristics

Table 2 shows the total number of 30-day prescriptions filled for the 20 most common drug classes in 2010. The number of prescriptions in each drug class generated the same top 20 drug classes for both providers; however, the share of prescriptions for each class varied slightly across classes. The largest differences were for behavioral medications. NP beneficiaries filled a greater percentage of prescriptions for opioids (NPs 3.1% vs. PCPs 2.8%), psychotherapeutics (NPs 3.9% vs. PCPs 2.3%), anticonvulsants (NPs 3.2% vs. PCPs 2.5%), antidepressants (NPs 7.7% vs. PCPs 6.1%), and antipsychotics (NPs 2.9% vs. PCPs 1.5%). In contrast, PCP beneficiaries filled a greater percentage of prescriptions for antihypertensives (NPs 9.7% vs. PCPs 10.5%) and antihyperlipidemics (NPs 8.3% vs. PCPs 9.8%). All drug groups tested as sig-

nificantly different for NP and PCP beneficiaries at $p < .05$, except antiasthmatics.

Provider Prescribing Patterns

NP beneficiaries received on average 59.7 prescriptions in 2010 compared with PCP beneficiaries, who received 58.9 prescriptions, or approximately one additional 30-day prescription per year. This trend was consistent and statistically significant across most drug groups except for antihyperlipidemics, antiasthmatics, and endocrine and ophthalmic medications.

Number of Prescriptions per Beneficiary and Beneficiary Comorbidities

The authors conducted subanalyses by the number of comorbidities to address descriptively that beneficiaries attributed to PCPs

TABLE 3

Average Number of Prescriptions Filled Per Beneficiary by Comorbidities: Top 20 Drug Classes

	0–3 Comorbidities			4–6 Comorbidities			> 6 Comorbidities		
	PCP	NP	Difference NP–PCP	PCP	NP	Difference NP–PCP	PCP	NP	Difference NP–PCP
Antihypertensives	10.82	10.76	–0.06	11	10.92	–0.08	10.3	10.48	0.19
Antihyperlipidemics	10.19	9.91	–0.29	10.35	10.27	–0.08	9.84	9.96	0.12
Beta-blockers	10.04	10.13	0.09	10	10.04	0.03	9.05	9.4	0.35
Diuretics	9.12	8.91	–0.21	9.23	9.46	0.23	9.04	9.57	0.53
Antidiabetics	13.79	14.02	0.22	14.66	14.6	–0.06	13.38	13.93	0.55
Antidepressants	9.63	9.51	–0.13	10.18	10.95	0.77	10.12	11.49	1.37
Ulcer drugs	8.11	8.3	0.19	8.37	8.59	0.23	7.98	8.27	0.29
Calcium channel blockers	9.98	9.72	–0.26	9.86	9.94	0.07	8.57	8.96	0.38
Thyroid agents	10.58	10.48	–0.1	10.82	10.67	–0.15	10.18	10.55	0.37
Analgesics, opioids	2.6	3.36	0.75	3.35	4.28	0.93	4.19	4.89	0.7
Anticonvulsants	7.5	7.56	0.06	8.25	9.69	1.44	8.69	10.22	1.53
Antiasthmatics	6.14	6.73	0.59	7.31	7.17	–0.14	6.77	6.34	–0.44
Minerals	7.9	7.89	–0.01	8.01	8.05	0.03	6.62	7.08	0.46
Psychotherapeutic agents	10.52	11.45	0.93	11.8	13.05	1.26	10.62	12.45	1.83
Anticoagulants	8.8	8.83	0.03	8.88	9.7	0.83	8.36	10.34	1.98
Hematologic agents	9.26	9.85	0.58	9.09	9.36	0.27	8.13	8.69	0.56
Endocrine-metabolic agents	8.42	8.28	–0.14	8.2	8.21	0	7.17	7.42	0.25
Ophthalmic agents	4.49	4.12	–0.37	4.62	4.8	0.17	4.41	4.81	0.4
Antipsychotics	8.61	9.66	1.05	9.32	10.74	1.42	8.25	10.35	2.1
Anti-inflammatories	4.2	4.59	0.4	4.6	4.81	0.21	4.16	4.51	0.36

may be sicker and may thus require a different approach to drug management. Table 3 shows the number of prescriptions for the top 20 drug classes with subanalyses by the number of comorbidities. The difference between NP and PCP beneficiaries is indicated for each comorbidity group. The data suggest that, for those in the low comorbidity group, NP beneficiaries received slightly fewer prescriptions than PCP beneficiaries for approximately half of the drug classes, and, for those in the moderate and high comorbidity groups, NP beneficiaries received more prescriptions than PCP beneficiaries. In the high comorbidity group, NP beneficiaries filled more prescriptions in all but one drug class. Figure 2 plots the difference in the number of prescriptions for NP and PCP beneficiaries by comorbidity group. The difference in the number of prescriptions increased as the number of comorbidities increased, and this difference was more pronounced for behavioral drug classes.

Number of Prescriptions, Number of Claims, and Days Covered per Prescription Claim

Figure 3 illustrates differences between NP and PCP beneficiaries in four panels. Panel A shows the differences in the number of prescriptions for all 307 medication groups. Each line represents

the positive differences between providers for each drug group. Panel B shows the positive difference of the number of days supplied between providers and illustrates that PCP beneficiaries receive a longer supply of a medication for 81% of all prescription drugs. Panel C plots the positive difference in number of claims for each drug group. For 80% of all medication groups, beneficiaries of NPs have more claims. Panel D illustrates the relationship between the number of prescriptions (Panel A) and number of claims (Panel C). The panel is ordered by number of prescriptions and shows the number of claims in light gray in the background. Panel D demonstrates that the number of prescriptions is unrelated to the number of claims because the pattern of the number of claims does not follow the contours of the number of prescriptions.

Number of Prescriptions and State Scope of Practice Regulations

The authors conducted follow-up analyses to examine if the general pattern of greater number of NP prescriptions was related to state scope of practice regulations. The authors categorized scope of practice legislations as independent prescribing and restrictive prescribing. The former included scopes of practice that allowed NPs to prescribe independently from physicians, including states that allowed NPs to prescribe schedule III drugs. The latter included

FIGURE 2

Difference in the Average Number of Prescriptions Between Nurse Practitioner and Primary Care Physician Beneficiaries by Number of Comorbidities: Top 20 Drug Classes

Note. Prescriptions are standardized to a 30-day supply.

* $p < .05$

Dashed vertical lines indicate mean differences in number of prescriptions in each comorbidity group.

Drug groups are sorted by the size of the difference.

Drug groups in black indicate behavioral medication classes.

scopes of practice that require NPs to prescribe in collaboration with a physician or under a physician's supervision.

Figure 4 illustrates that NP beneficiaries receive more prescriptions from NPs under both types of scope of practice regulation. Because Figure 4 shows averages across states, the authors also calculated the difference in the number of prescriptions for NP and PCP beneficiaries for each state for the top 20 drug classes. The authors did not find that state scope of practice regulation significantly affected the trend of NP beneficiaries receiving more prescriptions (data not shown).

Brand vs. Generic Medications

The share of generic prescriptions was 72% for both NP and PCP beneficiaries. This percentage is approximately equivalent to 42 generic prescriptions per beneficiary out of 59 prescriptions for both provider types.

Discussion

Beneficiaries assigned to NPs were more likely to be in the later stages of the Part D drug benefit phase. Having more claims in the later benefit phases may indicate that a larger proportion of NP beneficiaries have conditions that require more expensive medications or that NP beneficiaries have clinical conditions that require more prescriptions. Together with the authors' findings on the higher volume of prescriptions for NP beneficiaries, these possible explanations require further study in a multivariate regression context, taking into account plan characteristics and other factors.

Analysis of the type of prescriptions indicated that the that the top 20 drug classes received by NP and PCP beneficiaries were similar. Further, both providers used generic prescriptions at essentially the same rate, which is not surprising because formularies, rather than individual providers, determine such choices.

The typical NP beneficiary received more prescriptions than the PCP beneficiary, and prescriptions and refills came with fewer days of medication coverage. Shorter days' supply on a claim suggests that refills must be requested more often if the medication

FIGURE 3

Relationship Among Number of Prescriptions, Number of Claims, and Average Days' Supply for NP and PCP Beneficiaries

Note. Panels A through D show differences in study prescribing measures for nurse practitioner (NP) and primary care physician (PCP) beneficiaries for Medi-span's smallest therapeutic classification system break down. Each bar represents one drug group. Bars colored in black indicate drug groups that were statistically different between NP and PCP beneficiaries at a significance level of $p < .05$. Only drug groups with > 10 prescription claims for each provider type were included. Panel A shows differences in the number of prescriptions (standardized to 30-day supply) for all drug groups (sorted by the size of the difference in descending order). Panel B shows differences in the days' supply for each drug group (sorted by the size of the differences in descending order). Panel C shows the difference in the number of claims per beneficiary for each of the drug groups (sorted by the size of the difference in descending order). Panel D shows the difference in the number of prescriptions (standardized to 30-day supply), together with the difference in the number of claims (light gray) for each of the drug groups sorted by the number of prescriptions.

is to be taken continuously, requiring communication with the primary care team, such as a telephone call or an online message. Contact with the provider at certain time intervals may be part of the pharmaceutical management plan. An office visit or a phone call provides an opportunity for the provider and the patient to communicate. For patients taking medications with high adverse-effect profiles, such communication may be necessary, and it offers an opportunity to strengthen patient-provider rapport. However, it could be an unnecessary burden to the patient, resulting in the patient running out of a medication sooner than necessary. A greater number of visits may also lead to increased administrative costs and time costs incurred by the patient.

Limitations

The authors followed an attribution approach that used claims from E&M services belonging to primary care service codes to ensure that only NPs and PCPs working in primary care were part of the providers that were attributed to beneficiaries. Although the authors are confident that this approach facilitated the elimination of providers employed in specialty areas, some physician specialists and NPs working in specialist practices and clinics who billed for primary care services may be included in the provider pool.

The authors' analysis used administrative claims data, which includes NPs with their own NPI number. Thus, the analysis may not reflect all the Medicare services provided by NPs because those without their own NPI number who provide services for Medicare beneficiaries need to bill through another provider's NPI number, which could be an NP or a physician. However, even for the NPs with their own NPI numbers, services may be charged "incident to" a physician because Medicare reimbursement is higher for physicians than for NPs. Incident to billing is allowed when certain requirements are met, such as an initial encounter between a physician and a patient, and a physician's presence in the office when the NP sees patients (Shay, 2015). States that have restrictive NP scope of practice laws may have higher rates of incident to billing, but even in states where NPs can practice autonomously, incident to billing may occur because of the financial incentive of higher reimbursement. For these reasons, the study results do not reflect the services provided by NPs who do not have their own NPI number.

Finally, the results should be interpreted with the awareness that they are descriptive in nature and do not adjust for differences in patient characteristics between NP and PCP beneficiaries. The authors stratified the number of prescriptions by comorbidities (See Figure 2), which was the only partial adjustment. However, the authors analyzed medication groups at a fine level of aggregation using Medi-span's drug group classification to help ensure comparison of similar patients. The authors also examined whether the results were sensitive to state scope of practice laws and independent NP prescribing versus collaborative NP-physician prescribing and did not find that scope of practice regulations significantly affected the prescribing patterns of providers observed in these data. Although the authors explored this association only for the

FIGURE 4

Difference in Number of Prescriptions Between Nurse Practitioners and Primary Care Physician Beneficiaries by State Scope of Practice Laws: Top 20 Drug Classes

Note. The number of prescriptions is standardized to a 30-day supply. The bars to the right of zero indicate the positive difference in nurse practitioner prescriptions compared with primary care physician prescriptions.

20 most common drug classes, the prescribing patterns of NPs and PCPs were observed in the majority of states regardless of state scope of practice regulations. Thus, the prescribing practices of clinicians are probably not that influenced by scope of practice laws but might be related to individual clinician behavior and differences in practice styles between NPs and PCPs.

Conclusion

Key differences were observed in the number and duration of prescriptions written by NPs and PCPs. The findings warrant further study. Understanding how prescribing differences between NPs and PCPs affect patients clinically would emphasize the strengths of each type of provider and help guide the evaluation of NP scope of practice regulations. Such an understanding would also provide valuable information for workforce strategies aimed at increasing the capacity of the primary care workforce using NPs.

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