

Economic Burden of Treating Chronic Peripheral Neuropathic Pain in the United States: National Estimates From 2022 Data

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BACKGROUND

- Nearly 10 million people suffer from chronic peripheral neuropathic pain (PNP) in the United States (US).¹
- PNP is associated with a high degree of burden on patients due to the limited availability of efficacious treatments, and overall symptom burden.^{2,3}
- PNP patients are high consumers of health care resources; however, published evidence on the economic burden of PNP in the US is limited.⁴

OBJECTIVE

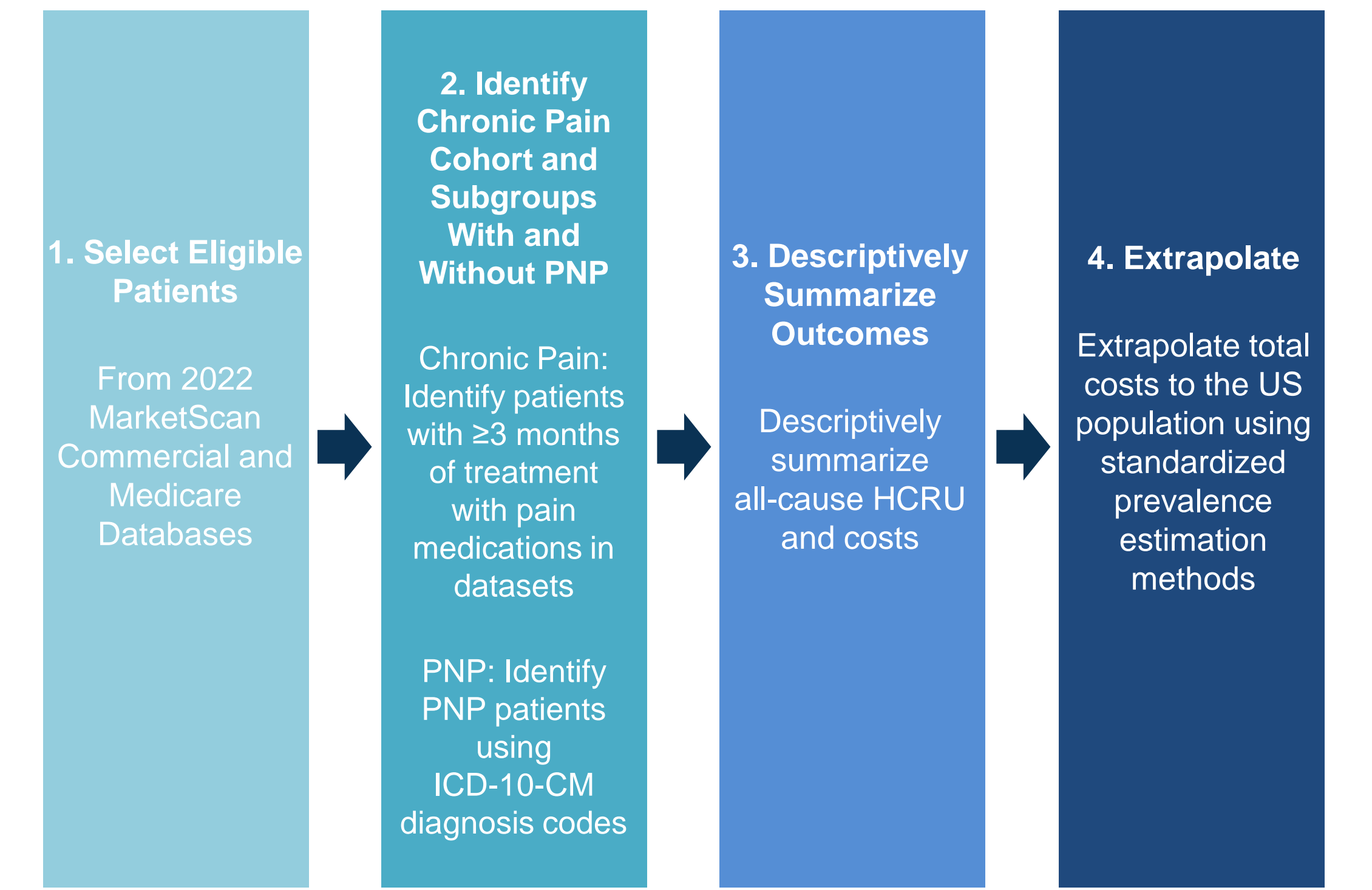
- To examine healthcare resource utilization (HCRU) and the associated economic burden of managing chronic PNP in the US.

METHODS

Study Design

- This retrospective, cross-sectional, observational study used the Merative® MarketScan® Commercial Claims and Medicare Databases [1/1/2022-12/31/2022 (“Study period”)] to describe patients in the US using prescription medications to manage chronic PNP pain.
- Chronic pain patients were stratified into those with PNP and those without PNP.
- Annual all-cause healthcare utilization (inpatient admissions, outpatient encounters, outpatient pharmacy), and all-cause direct medical costs were descriptively summarized over the study period separately for chronic pain patients with and without chronic PNP.
- The PNP cohort was further evaluated among those with and without evidence of opioid use.
- Total costs were extrapolated to national-level estimates in 2022 using person-level weights based on US Census demographic distribution to project to the US national population using age and gender standardized estimates.

Figure 1. Study Design



HCRU: healthcare resource utilization; ICD-10-CM: International Classification of Diseases, Tenth Revision; PNP: peripheral neuropathic pain

Sample Selection

- Patients aged 18 years or older, continuously enrolled in the MarketScan Commercial or Medicare Databases with medical and pharmacy benefits from January 1–December 31, 2022, and had at least one pharmacy claim or medical claim for a pain medication in 2022 were included.
- Pain medications considered in the analysis included opioids, nonsteroidal anti-inflammatory drugs (NSAIDs), anti-convulsants, local anesthetics, serotonin and norepinephrine reuptake inhibitors (SNRI) antidepressants, and non-opioid analgesics (including acetaminophen and aspirin).
- Aligned with the International Association for the Study of Pain (IASP) definition,⁵ patients with ≥3 months of continuous or recurrent use of prescription pain medication within the study period were classified as chronic pain patients.
- PNP patients were identified using ICD-10-CM diagnosis codes for the following peripheral neuropathy conditions:
 - Compression neuropathy, diabetic neuropathy, non-diabetic small fiber neuropathy, post-herpetic neuropathy, traumatic neuropathy, radiculopathy, trigeminal neuropathy, and other peripheral neuropathy

RESULTS

Study Population and Clinical Characteristics

- Among the 1,159,539 chronic pain patients identified, approximately one-third had ≥1 chronic PNP condition (33.3%, N = 386,393). Demographics and clinical characteristics of the study population are shown in **Table 1**.
- Among PNP patients, the most prescribed pain medications were anti-convulsants (61.0%) followed by NSAIDs (56.3%) and opioids (54.1%). Among chronic pain patients without PNP, the most prescribed pain medications were NSAIDs (51.1%), antidepressants (48.3%), and opioids (33.4%).
- The most common PNP conditions reported within the study cohort were radiculopathy (63.2%) followed by non-diabetic small fiber neuropathy (18.0%) and diabetic peripheral neuropathy (17.8%).

Table 1. Demographics and Clinical Characteristics

	Chronic Pain Cohort With PNP N=386,393	Chronic Pain Cohort Without PNP N = 773,146
Age (years), mean (SD)	56.7 (13.7)	51.0 (14.8)
Male, n (%)	143,754 (37.2)	249,046 (32.2)
Female, n (%)	242,639 (62.8)	524,100 (67.8)
Evidence of major surgical procedure,^a n (%)	99,279 (25.7)	119,492 (15.5)
Evidence of minor surgical procedure,^a n (%)	381,396 (98.7)	741,760 (95.9)
Most common clinical conditions,^b n (%)		
Anxiety	123,347 (31.9)	280,114 (36.2)
Cancer	122,004 (31.6)	227,085 (29.4)
Depression	106,101 (27.5)	239,078 (30.9)
Diabetes	123,843 (32.1)	114,708 (14.8)
Hypercholesterolemia	118,790 (30.7)	169,348 (21.9)
Hypertension	223,362 (57.8)	319,748 (41.4)
Obesity	134,459 (34.8)	213,139 (27.6)
Osteoarthritis	182,367 (47.2)	180,588 (23.4)
Sleep disorders	119,164 (30.8)	185,245 (24.0)
Patients with treatment, n (%)		
Anti-convulsant	235,521 (61.0)	246,545 (31.9)
NSAIDs	217,484 (56.3)	395,260 (51.1)
Opioid	209,213 (54.1)	257,925 (33.4)
Anti-depressant	153,104 (39.6)	373,096 (48.3)
Local anesthesia	27,107 (7.0)	32,938 (4.3)
Non-opioid analgesics	18,295 (4.7)	30,106 (3.9)
PNP conditions, n (%)		
Radiculopathy	244,176 (63.2)	--
Non-diabetic small fiber neuropathy	69,521 (18.0)	--
Diabetic neuropathy	68,895 (17.8)	--
Other peripheral neuropathy	40,523 (10.5)	--
Compression neuropathy	38,967 (10.1)	--
Post-herpetic neuropathy	14,401 (3.7)	--
Trigeminal neuropathy	10,335 (2.7)	--
Traumatic neuropathy	2,378 (0.6)	--

Chronic pain conditions other than PNP, n (%)

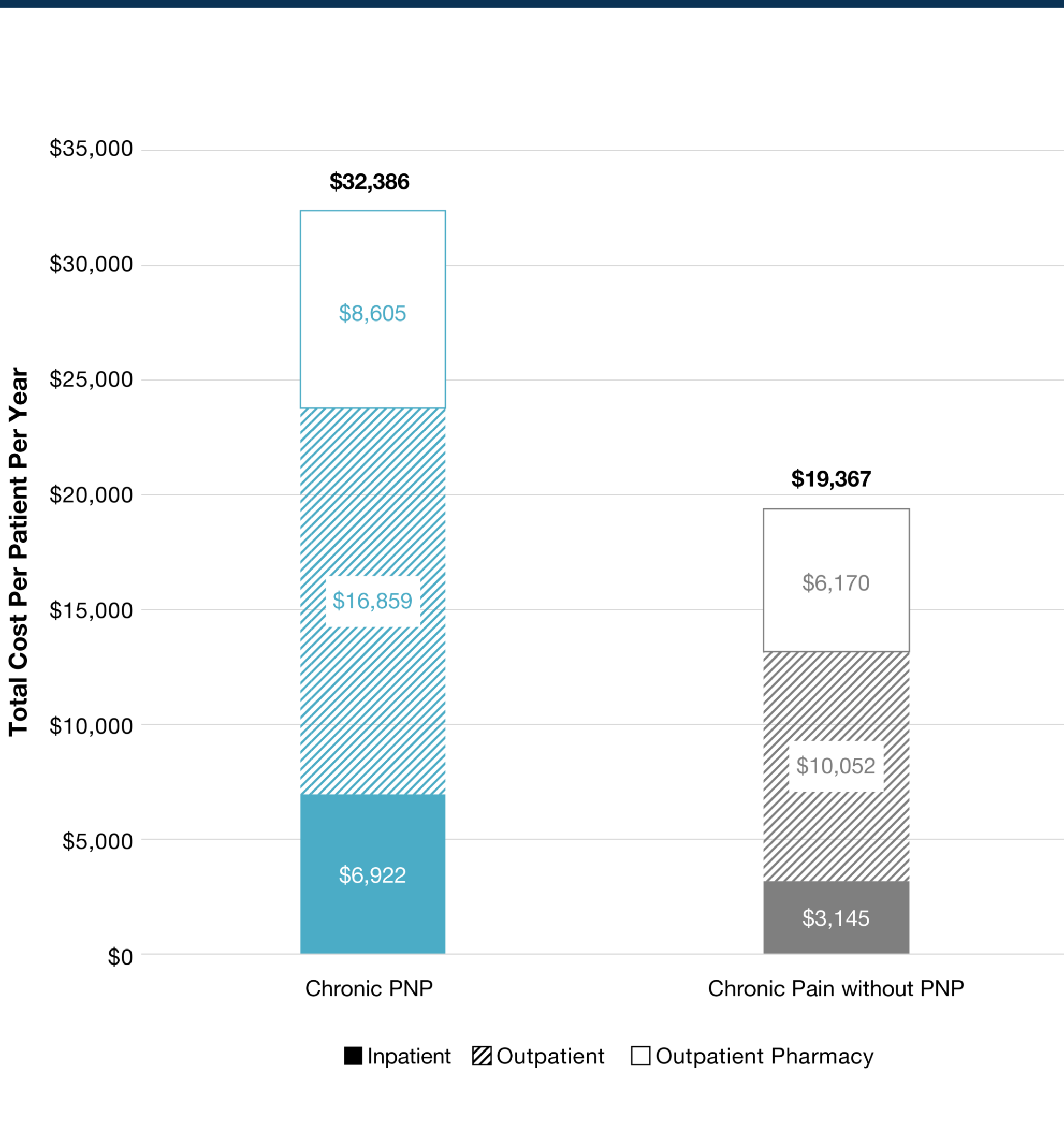
Musculoskeletal	341,287 (88.3)	519,260 (67.2)
Visceral	197,712 (51.2)	362,327 (46.9)
Cancer	122,004 (31.6)	227,085 (29.4)
Other	86,242 (22.3)	144,628 (18.7)
Headache	52,050 (13.5)	111,848 (14.5)
Central neuropathic pain	16,203 (4.2)	10,582 (1.4)

N: number of participants; n: number of participants in the specified category; NSAIDs: nonsteroidal anti-inflammatory drugs; PNP: peripheral neuropathic pain; SD: standard deviation
Demographics were summarized from the claim closest to January 1, 2022. Clinical characteristics were summarized over the study period.
^a Measured during the study period. Denominator is all patients. Patients can have both a major and minor procedure within the year. Minor procedures on the same claim with a major procedure will not contribute as these occur in support of a major procedure.
^b Categories are not mutually exclusive. Patients may have more than one clinical condition during the year. Conditions with >20% in any cohort are shown.

Healthcare Resource Utilization and Costs – Chronic Pain Patients With PNP and Without PNP

- PNP patients had higher utilization of both inpatient and outpatient services than chronic pain patients without PNP.
 - Specifically, the PNP cohort showed a greater proportion of patients with inpatient admissions, ER visits, and outpatient hospital services.
- The higher HCRU translated to an approximately 1.7-times higher cost per patient for those with chronic PNP compared to those without chronic PNP (**Figure 2**).

Figure 2. Annual All-Cause Healthcare Resource Utilization Associated Per-Patient Costs: Chronic Pain Cohort With vs Without PNP



PNP: peripheral neuropathic pain

Healthcare Resource Utilization and Costs – PNP Patients Managing Pain With and Without Opioids

- Among PNP patients, those managing pain with opioids incurred greater HCRU than those patients not taking opioids; examples below:
 - The proportion of patients with inpatient admissions was 19.1% (n = 40,049) for those using prescription opioids compared to 6.7% (n = 11,827) for those not using opioids; 44.1% (n = 92,250) of patients using opioids visited an ER compared to 26.2% (n=46,496) not using opioids; 85.5% (n=178,846) of patients using opioids utilized outpatient hospital services compared to 71% (n=125,745) not using opioids.
- Among this PNP cohort, the per patient costs reflect the trends observed for HCRU. Those patients receiving opioid prescriptions reported greater than two-fold higher annual costs (\$43,874/patient) than the subgroup not receiving opioids (\$18,821/patient) (**Figure 3**).

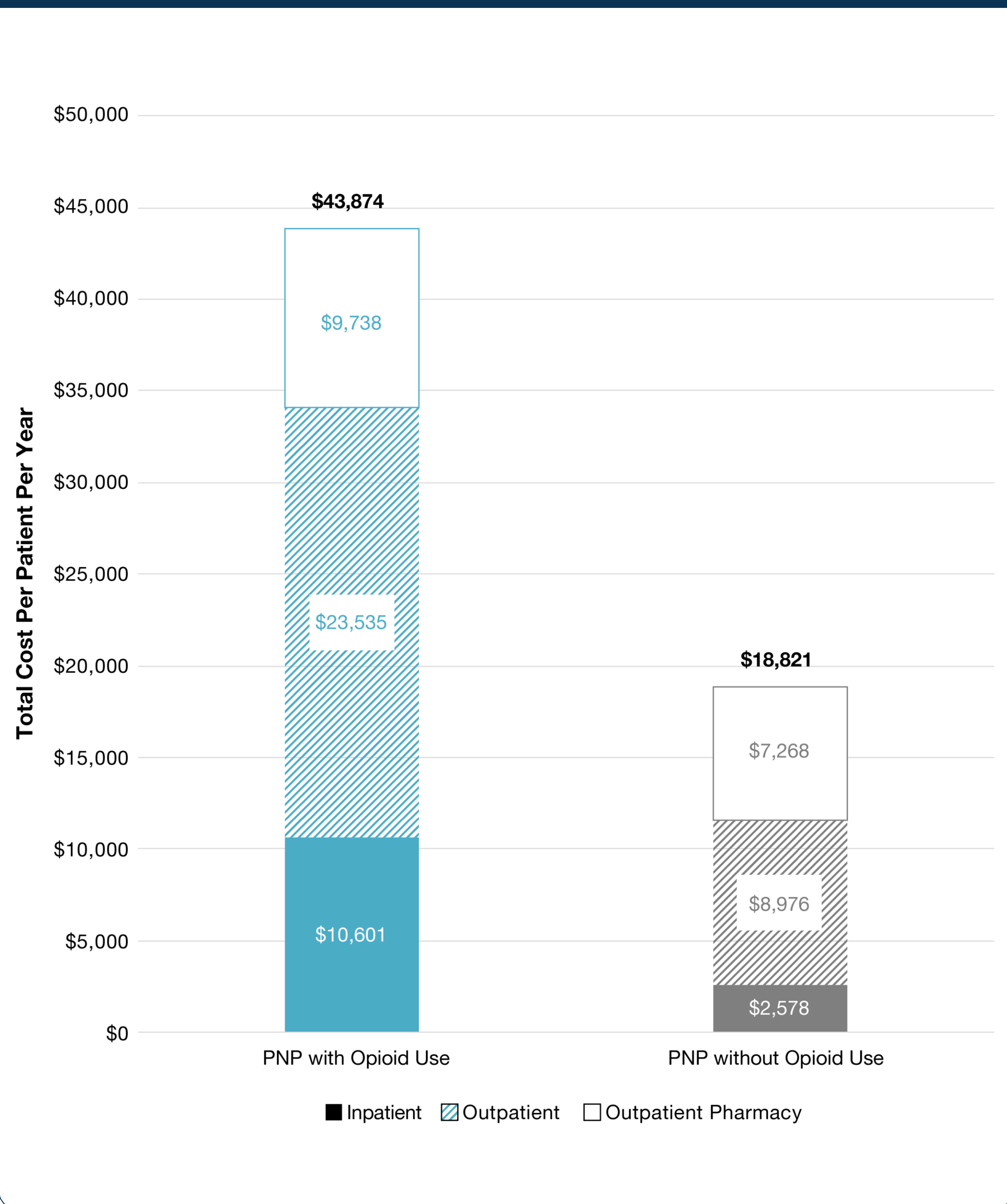
LIMITATIONS

- Use of pain medications was identified largely by claims for filled prescriptions; patients' actual usage of medications cannot be ascertained from healthcare claims.
- Medication use to determine the chronic pain population was limited to a 12-month period. Any claims that occurred before or after that period were not utilized even if days' supply would have coverage during the period of interest.
- Classification as chronic pain is based on an algorithm adapted for data in administrative claims.
- MarketScan databases are convenience samples comprised of people with employer sponsored health insurance (ESI) and represent about 50% of the full US population; therefore, there may be limitations associated with projecting to the full US population.

CONCLUSIONS

- Among all individuals identified with chronic pain, the chronic PNP subgroup represented one-third of the population but accounted for approximately 50% of total annual costs for all chronic pain patients.
- Among the PNP subgroup, the subgroup managing pain with prescription opioids reported greater HCRU than the subgroup not using opioids at the per patient level, which translated to nearly two-times greater cost at the per patient level and nearly 2.5-times greater cost at the national level per year.
- The results highlight the substantial economic burden associated with managing chronic PNP to the US healthcare system.
- Additionally, the results highlight the disproportionately higher economic burden associated with managing chronic PNP with opioids, which underscores the need for effective non-opioid treatments.

Figure 3. Annual All-Cause Healthcare Resource Utilization Associated Per-Patient Costs: Chronic PNP Cohort With vs Without Opioid Use



PNP: peripheral neuropathic pain

- When projected to the national level, the total annual economic burden of managing patients with chronic PNP in 2022 was \$348 Billion (B). For patients without PNP, the total annual economic burden was \$377 B.
- Among the subgroup with PNP managing pain with prescription opioids, the national-level annual economic burden was \$252 B; the annual economic burden for the PNP subgroup not using prescription opioids was \$96 B.

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AUTHOR DISCLOSURES

- AS** received research funding from the Department of Defense and the Orthopaedic Research and Education Foundation
- JP, MM, and HV** are employees of Merative
- JMG, ZW, LS, MS, and AM** are employees of Vertex Pharmaceuticals and may own stock/stock options in the company

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