

## Observational Study



# Factors Influencing Receipt of Interventional Pain Management Among Medicaid Beneficiaries with Cancer

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**Background:** Pain is common among cancer patients. Nonclinical factors may affect receipt of pain management among Medicaid beneficiaries with cancer.

**Objectives:** To examine associations of patient characteristics and US state-level Medicaid policies on receipt of interventional pain management among Medicaid beneficiaries with breast or colorectal cancer.

**Study Design:** A retrospective analysis of 2006-2008 Medicaid claims data.

**Setting:** Claims data from facilities providing care to Medicaid beneficiaries.

**Methods:** Interventional pain management among Medicaid beneficiaries aged 18-64 years with breast or colorectal cancer was identified using procedure codes in Medicaid claims data. State-level Medicaid policy variables included physician visit reimbursements, required patient copayments, and time period for Medicaid eligibility recertification (12 vs. < 12 months). Analyses also examined beneficiary race/ethnicity, age, comorbidities, and cancer treatment. Generalized estimating equations controlling for clustering by state assessed factors influencing receipt of interventional pain management.

**Results:** The study included 8,438 Medicaid beneficiaries with breast or colorectal cancer. Colorectal cancer (vs. breast cancer) patients were significantly more likely to receive interventional pain management. Medicaid policies were not significantly associated with receipt of interventional pain services. Among breast cancer patients, older age and non-Hispanic white race/ethnicity were associated with decreased likelihood of receiving interventional pain management; more comorbidities and receipt of breast conserving surgery were associated with increased likelihood. Demographic characteristics were not significantly associated with receipt of interventional pain management among colorectal cancer patients.

**Limitations:** Sample size of Medicare beneficiaries with cancer receiving interventional pain management; limited information included in Medicare claims data.

**Conclusions:** State-level Medicaid policies were not significantly associated with receipt of interventional pain management for breast or colorectal cancer patients; disparities in receipt of these services were observed only for breast cancer patients. These results may help develop policies to enhance access to appropriate pain management services.

**Key words:** Cancer pain, pain management, Medicaid, health care disparities, breast neoplasms, colorectal neoplasms, health policies, physician practice patterns, retrospective studies, claims analyses

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**P**ain is a common symptom among individuals with cancer; > 50% of individuals diagnosed with cancer need treatment for pain (1-3). Among individuals with metastatic disease, > 70% may experience pain (4,5). However, the experience of cancer pain is not uniform among all patients; for example, in the United States, individuals from racial/ethnic minority populations are more likely to report cancer pain than are non-Hispanic whites (4,6-9). Among individuals diagnosed with advanced (stage IV) cancer, the prevalence of pain and the likelihood of reporting severe pain is greater among younger patients, non-white patients, those who did not speak English as their primary language, and those who were uninsured or had government-funded insurance for low-income individuals (i.e., Medicaid coverage) (4).

Recent guidelines recommend that clinicians screen individuals with cancer for pain at each encounter (10); even mild cancer pain can substantially interfere with daily activities (11). Despite these recommendations, individuals with cancer often do not receive adequate pain treatment. A systematic review of recent studies reported that > 30% of individuals with cancer are untreated for pain (3). Among a cohort of newly diagnosed lung cancer patients, 27% reported that they needed to see a pain management expert but did not receive this service; the unmet need for pain care was higher (37%) among black cancer patients (12). Individuals from underserved populations including racial/ethnic minority groups are less likely to receive appropriate cancer pain treatment (2,9,13-16). Undertreatment of pain is also associated with insurance status. For example, among individuals with cancer residing in nursing homes, those in facilities with a higher Medicaid patient load were less likely to receive pain medications (17). Among individuals with cancer referred to a supportive care center, those with Medicaid or who were uninsured had higher pain levels (18).

Supportive and palliative care for individuals with cancer can improve pain and other symptoms, and increase satisfaction, and survival (19). A recent meta-analysis found that receipt of palliative care was significantly associated with improvements in quality of life, patient and caregiver satisfaction, and lower health care use (20). Pain management for individuals with cancer generally focus on opioids and other pharmacologic treatments; however, some opioids show poor evidence of pain relief among individuals with cancer (21). Although oral treatment is preferred for cancer pain, interventional pain management can also be

appropriate for patients not receiving adequate relief or experiencing intolerable side effects (22-25). For example, among individuals with cancer whose pain is not adequately addressed by other treatments, intrathecal drug infusion therapy may be appropriate (26,27). Interventional pain management includes spinal injections, nerve blocks, radiofrequency ablation, neurostimulation, and intrathecal drug delivery (28). There has been a substantial increase in receipt of interventional pain management over the past 2 decades. From 2000-2009, use of interventional pain management increased annually by 11.8% among Medicare beneficiaries (29). Rates of interventional pain management among Medicaid beneficiaries decreased annually by 0.6% from 2009-2016, although there were still annual increases in interventional pain treatment rates for 3 of these 7 years (29). However, rates of interventional pain management among Medicaid beneficiaries with cancer are unknown.

Medicaid is a US insurance program that pays for specific health care services for certain groups of low-income individuals. Medicaid provides coverage for cancer treatment for many low-income individuals, including treatment of pain and other symptoms associated with cancer and cancer treatment. However, Medicaid policies differ between states; it is unknown whether these state-level policy differences affect receipt of pain management services for Medicaid beneficiaries with cancer. In addition, little is known about the association of Medicaid beneficiaries' demographic and clinical characteristics with receipt of cancer pain management; that is, among individuals with Medicaid coverage, are there disparities in receipt of cancer pain services? We performed this study to examine the association of state-level Medicaid policies and Medicaid beneficiary characteristics on receipt of interventional pain management. -

## **METHODS**

### **Study Data and Population**

This retrospective analysis used 2006-2008 Medicaid Analytic eXtract (MAX) claims and enrollment data (the most recent years of data available at study initiation) to examine associations between 3 types of Medicaid policies (reimbursements, required patient copayments, and required time period for Medicaid eligibility recertification) on receipt of interventional pain management services among Medicaid beneficiaries with breast or colorectal cancer. Breast and colorectal

cancer are 2 of the most common cancer types in the United States (30), and more than half of individuals with these cancers report experiencing pain (31). Study data were from prior to implementation of the Affordable Care Act (ACA), and therefore, represent treatment patterns and policies that were not affected by the ACA. The study population consisted of individuals aged 18-64 years, enrolled in fee-for-service Medicaid and diagnosed with breast or colorectal cancer. As cancer registry data linked to Medicaid claims data were not available, claims were used to identify cancer diagnoses. Using case finding algorithms presented in previously published studies (32-34), Medicaid beneficiaries were classified as having been diagnosed with either type of cancer using 2 criteria. First, beneficiaries were required to have at least 2 Medicaid claims with International Classification of Disease, Ninth Revision (ICD-9) diagnosis codes for breast cancer (174.x, 233.0, 238.3, or 239.3) or colorectal cancer (153.x, 154.0, 154.1, 230.3, 230.4) at least 30 days apart. In addition, beneficiaries were required to have a subsequent claims with a procedure code for a cancer-specific surgery. Among Medicaid beneficiaries diagnosed with breast cancer, this included mastectomy or breast conserving surgery (BCS). Mastectomy was identified by Current Procedural Terminology (CPT) codes 19160, 19162, 19180, 19182, 19200, 19220, 19240, or 19303-19307; ICD-9 procedure code 85.4x; or Diagnosis Related Group (DRG) codes 257 or 258. BCS was identified by CPT codes 19120, 19125, 19126, 19301, or 19302; ICD-9 procedure codes 85.20, 85.21, 85.22, or 85.23; or DRG codes 259 or 260. Among colorectal cancer patients, acceptable CPT codes were 44100, 44140-44160, 44204-44212, 44322, 44389, 45100, 45110-45190, 45305, 45308-45315, 45320, 45331, 45333, 45338, 45339, 45342, 45380, 45383-45385, or 45392-45397, whereas acceptable ICD-9 procedure codes were 45.4x, 45.7x, 45.8x, 48.3x, 48.4x, 48.5x, 48.6x, or 48.82. The list of surgical procedures does not include codes for biopsy only. Receipt of a biopsy in the absence of subsequent surgical resection may indicate a "rule out" for breast or colorectal cancer and is therefore, by itself, not sufficient evidence of a cancer diagnosis. Medicaid claims data do not include information on cancer stage, geographic area of beneficiary, or pain experienced (e.g., pain intensity or acute vs. chronic nature).

Dual Medicare-Medicaid enrollees were excluded from the study population as their complete service use may not be reported in MAX. Beneficiaries in capitated managed care plans were also excluded as Medicaid reimbursements, a key independent variable for this study,

are not included in their claims data. As beneficiaries with limited Medicaid enrollment periods are less likely to have an opportunity to receive interventional pain management services, beneficiaries with < 4 months of enrollment were excluded. Beneficiaries who were pregnant or resided in a long-term care facility were excluded.

The study population analyzed for receipt of interventional pain management was limited to states in which at least one Medicaid beneficiary with breast or colorectal cancer had claims for interventional pain management services, to ensure that such services were covered for Medicaid beneficiaries. Medicaid data from 40 states and the District of Columbia were included in the breast cancer analysis and from 28 states in the colorectal cancer analysis.

### Study Outcome Measure

We evaluated the association between demographic characteristics and Medicaid policies with receipt of interventional pain management services. To identify receipt of these pain services, we used an approach similar to that of previous studies (29,35) to capture Medicaid claims with relevant CPT codes. The included CPT codes were codes 62310-62319 (epidural/subarachnoid injections), 62350-62368 (infusions and pumps), 63650-63688 (neurostimulation), 64400-64530 (nerve blocks/injections), 64600-64640 (nerve blocks/injections/ destruction), and 64680-64681 (nerve injections). Claims containing these procedure codes were included in this study only if they occurred after cancer diagnosis.

### Study Independent Variables

The main independent variables of interest were state-level Medicaid policies. Medicaid reimbursements for physician visits were determined as the state- and year-specific median reimbursement for CPT 99213 (level 3 [middle] office or outpatient visit with an established patient). Two other state-level Medicaid policies were also included as predictor variables: whether a patient copayment was required for physician services; and whether recertification of Medicaid eligibility was required once every 12 months versus at intervals of < 12 months, as this may affect continuity of care (36-38). Other included independent variables were race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, and other); gender (for colorectal cancer analysis only); age at cancer diagnosis; duration of Medicaid enrollment; and comorbidities score (using the Deyo et

al [39] modification of the Charlson Index, with cancer diagnosis not included) coded as < 2 comorbidities versus 2 or more comorbidities. To help control for cancer stage at diagnosis (which is not available in the Medicaid claims data), we also controlled for receipt of any chemotherapy, receipt of any radiation therapy, and receipt of BCS (vs. mastectomy, for breast cancer patients only). In addition, to control for differences in costs of medical care and the relative generosity of state-level Medicaid reimbursements, average annual medical care costs for each state were also included.

### Data Analytic Procedures

Multivariable analyses using generalized estimating equations were used to assess factors influencing receipt of interventional pain procedures while con-

trolling for clustering by state. A modified Poisson regression model with robust error variance was used to determine relative risk values for associations of independent variables with receipt of interventional pain management (40,41). Separate models were derived for breast and colorectal cancer patients. No attempt was made to impute missing values. Analyses were performed using PROC GENMOD in SAS, Version 9.4 (SAS Institute, Inc., Cary, NC).

### RESULTS

Table 1 displays characteristics of the patients in the breast and colorectal cancer study populations.

The study populations consisted of 8,438 Medicaid beneficiaries from states with at least one interventional pain management service claim (7,385 with breast cancer, 1,053 with colorectal cancer). Overall, 3.3% of Medicaid beneficiaries with breast cancer and 6.7% of those with colorectal cancer received interventional pain management services (difference significant at  $P < 0.001$ ). Just over half the study population was white, with a mean age of 51 (breast cancer) to 53 (colorectal cancer) years. The proportion with 2 or more comorbidities was significantly higher among colorectal cancer versus breast cancer patients (39.7% vs. 18.9%), whereas the proportion receiving radiation therapy was significantly lower for colorectal cancer patients (4.4% vs. 52.7%). Median Medicaid reimbursements for physician visits were \$30 breast cancer patients and \$34 for colorectal cancer patients.

Table 2 presents multivariable regression results for associations of receipt of interventional pain management services among Medicaid beneficiaries with breast cancer. Among this population, older individuals had significantly decreased receipt of pain management services. Compared with non-Hispanic white patients, those in other racial/ethnic groups had significantly decreased likelihood of receipt of interventional pain management. Breast cancer patients who received BCS rather than mastectomy had significantly greater likelihood of receipt of interventional pain management. Increased comorbidity score and greater duration of Medicaid enrollment was also associated with significantly increased likelihood of receipt of interventional pain management. State-level Medicaid policies, including physician visit reimbursements, period for redetermination of Medicaid eligibility, and required patient copayments for physician services, were not significantly associated with receipt of interventional pain management.

Table 1. Characteristics of study population.

Cancer Site	Breast Cancer	Colorectal Cancer
n	7,385	1,053
Used interventional pain management service, n (%)	244 (3.3)	71 (6.7)
Age at diagnosis, mean (SD)	50.6 (7.8)	52.5 (8.2)
Female, n (%)	7,385 (100)	581 (55.2)
Race/ethnicity, n (%)		
Non-Hispanic white	3,881 (52.6)	578 (54.9)
Non-Hispanic black	1,561 (21.1)	245 (23.3)
Hispanic	976 (13.2)	106 (10.1)
Other/unknown	967 (13.1)	124 (11.8)
2 or more comorbidities, n (%)	1,392 (18.9)	418 (39.7)
Received any chemotherapy, n (%)	3,687 (49.9)	496 (47.1)
Received any radiation therapy, n (%)	3,891 (52.7)	46 (4.4)
Breast conserving surgery (vs. mastectomy), n (%)	3,192 (43.2)	N/A
Months of Medicaid enrollment, median (range)	18 (5-36)	16 (5-36)
Medicaid reimbursement for physician visit, median (range)	\$30 (\$22-\$85)	\$34 (\$22-\$54)
Redetermination of Medicaid eligibility every 12 months (vs. < 12 months), n (%)	5,367 (72.7)	717 (68.1)
Required patient copayment for physician services, n (%)	4,940 (66.9)	636 (60.4)

SD, standard deviation.

## Pain Management Among Medicaid Cancer Patients

Table 2. *Adjusted relative risk and 95% confidence intervals for receipt of interventional pain management among breast cancer patients (n = 7,385).*

Variable	RR	Lower Bound	Upper Bound	P Value
Age at diagnosis (impact of 5 additional years)	0.94	0.88	1.00	0.0370
Race/ethnicity (vs. Non-Hispanic white)				
Non-Hispanic black	0.56	0.40	0.78	0.0005
Hispanic	0.41	0.30	0.55	< 0.0001
All other race	0.58	0.39	0.87	0.0079
Received chemotherapy	1.13	0.93	1.37	NS
Received radiation therapy	1.05	0.80	1.35	NS
Received breast conserving surgery (vs. mastectomy)	1.52	1.23	1.89	0.0001
Medicaid enrollment duration during study period (impact of one additional month of enrollment)	1.05	1.04	1.07	< 0.0001
2 or more comorbidities	1.93	1.53	2.43	< 0.0001
Medicaid recertification period of 12 months (vs. < 12 months)	0.94	0.65	1.37	NS
Patient copayment	0.85	0.60	1.22	NS
Reimbursement for physician visit (\$10 increase)	1.07	0.91	1.26	NS

Regression results for average state-level annual medical care are not shown.

Abbreviations: NS, nonsignificant; RR, relative risk.

( $P > 0.05$ ).

Table 3. *Adjusted relative risk and 95% confidence intervals for receipt of interventional pain management among colorectal cancer patients (n = 1,053).*

Variable	RR	Lower Bound	Upper Bound	P Value
Age at diagnosis (impact of 5 additional years)	1.10	0.97	1.24	NS
Race/ethnicity (vs. Non-Hispanic white)				
Non-Hispanic black	0.62	0.34	1.15	NS
Hispanic	1.63	0.83	3.20	NS
All other race	0.85	0.36	1.97	NS
Female	1.37	0.82	2.30	NS
Received chemotherapy	0.96	0.62	1.49	NS
Received radiation therapy	1.01	0.46	2.24	NS
Medicaid enrollment duration during study period (impact of one additional month of enrollment)	1.02	1.00	1.05	0.0452
2 or more comorbidities	1.05	0.65	1.69	NS
Medicaid recertification period of 12 months (vs. < 12 months)	0.84	0.46	1.54	NS
Patient copayment	1.50	0.78	2.90	NS
Reimbursement for physician visit (\$10 increase)	1.20	0.81	1.77	NS

Regression results for average state-level annual medical care costs are not shown. Abbreviations: NS, nonsignificant; RR, relative risk. ( $P > 0.05$ ).

Among the colorectal cancer population (Table 3), increased duration of Medicaid enrollment was the only characteristics significantly associated with receiving interventional pain management. None of the other independent variables were even marginally ( $P < 0.10$ )

associated with receipt of interventional pain management. As with the breast cancer population, none of the state-level Medicaid policies were significantly associated with receiving interventional pain management.

## DISCUSSION

To the best of our knowledge, this is the first study to examine rates of interventional pain management among Medicaid beneficiaries with cancer, and associations of beneficiary characteristics and state-level policies on receipt of interventional pain management services. We found that Medicaid policies, including reimbursements, copayment requirements, and length of recertification period, were not significantly associated with receipt of interventional pain management for either breast or colorectal cancer patients. Among Medicaid beneficiaries with breast cancer, disparities in receipt of interventional pain management were observed among older individuals and those with race/ethnicity other than non-Hispanic white. Multiple studies have reported disparities in receipt of pain treatment for a range of conditions based on race, age, socioeconomic status, and other social determinants of health (16,42-51), including receipt of treatment for cancer pain (2,13-15). Previous studies have also demonstrated disparities in receipt of pain treatment among other populations of Medicaid beneficiaries (43,52-54). For example, among Medicaid beneficiaries in North Carolina, black individuals with chronic non-cancer pain were less likely to fill an opioid prescription than were white individuals (54). The increased likelihood of receipt of interventional pain management among those in the breast cancer population with 2 or more comorbidities may reflect cancer-related pain frequency or intensity being exacerbated by concomitant conditions. In addition, previous literature has commented that clusters of comorbid symptoms can increase the negative impacts of pain among individuals with cancer (55). However, it is unclear why women who received BCS have increased likelihood of receipt of interventional pain services compared with those receiving mastectomy. Future research is needed to examine this difference.

As presented in Table 1, Medicaid beneficiaries with colorectal cancer were significantly more likely than those with breast cancer to receive interventional pain management ( $P < 0.001$ ). Individuals with colorectal cancer are significantly more likely to have advanced disease at diagnosis compared with individuals with breast cancer (56-58). This pattern is also observed among Medicaid beneficiaries; compared with individuals with breast cancer, Medicaid beneficiaries with colorectal cancer are more likely to be diagnosed with advanced disease (59) and to receive surgery (60). As prevalence of pain and pain severity are greater among individuals diagnosed with advanced cancer (61), this

may explain the greater use of interventional pain management among individuals with colorectal cancer. Medicaid beneficiaries with colorectal cancer also have increased 1-year and 5-year mortality compared with Medicaid beneficiaries with breast cancer (30,62); decreased life expectancy may increase the willingness of patients to accept (and physicians to offer) interventional pain management. The increased likelihood of advanced stage diagnosis and decreased life expectancy may also explain the lack of significant disparities associated with receipt of interventional pain management among the colorectal cancer population included in this study. In contrast, among Medicaid beneficiaries with breast cancer, the earlier diagnosis and longer life expectancy may facilitate disparate interventional pain treatment as described earlier.

Recent guidelines emphasize the need for clinicians to assess pain among individuals diagnosed with cancer (10). This should include examination of the impact of pain on distress and functional status and related physical, psychological, social, and spiritual factors. In addition, these guidelines recommend that clinicians determine the need for other health professionals to provide comprehensive pain management services. Results from the present study, indicating that reimbursement for physician consultations is not significantly associated with receipt of interventional pain management, suggest that pain specialists are willing to evaluate Medicaid beneficiaries with cancer for comprehensive pain management, even in states where reimbursements are lower.

This study had a number of limitations. The data for this study—national Medicaid claims and enrollment files—do not include information on stage at diagnosis. Receipt of interventional pain management services was determined with CPT codes present in Medicaid claims. Patient-reported outcomes, such as pain level, acute/chronic nature of pain, or satisfaction with interventional pain services, are not included in Medicaid claims. Research using other data sources are needed to collect more complete information on factors influencing receipt of interventional pain management among Medicaid beneficiaries with cancer. As with other studies using claims data, not all treatment information is available; the results therefore indicate association but not necessarily causation. The data are from 2006-2008; although these were the most recent data available at the start of this study, this may limit relevance to current policies. In particular, these data do not capture the potential impact of the ACA on Medicaid. However,



Medicaid reimbursements for many medical care services other than primary care visits have experienced little change over the past decade. In addition, to include information on reimbursement, only those enrolled in fee-for-service Medicaid were included. Finally, the dependent variable (receipt of interventional pain management services) captured service use only and did not provide information on quality of care.

## CONCLUSIONS

Despite these limitations, this study provided important information on potential barriers to receiving interventional pain management services among Medicaid beneficiaries with breast or colorectal cancer. Our findings indicated substantial disparities in receipt of these services among women with breast cancer, based on their age, race/ethnicity, and surgery received. State-level Medicaid policies were not associated with receipt of these services. This suggests that interventions are needed at the health care provider and health care system levels to increase access to appropriate pain management services among this underserved population. These provider- and system-level interven-

tions may include culturally sensitive pain assessments among individuals with cancer from racial/ethnic minorities and other vulnerable populations, as well as patient-centered information to facilitate collaborative decision-making regarding cancer pain treatment options. Additional information for oncology providers on the potential benefits of interventional pain management for appropriate cancer patients and survivors may also help address disparities in care. In addition, further research is needed to better understand differences in receipt of pain management services between individuals with breast and colorectal cancer.

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