

**Supplemental Table 1. The comparison between included and excluded 2010 dialysis prevalent patients**

Characteristics	All (n = 513,647)	Inclusion* (n = 153,758)	Exclusion (n = 359,889)	P-value
Male sex	55.7	52.2	57.3	<0.001
Race				<0.001
White	58.9	52.2	61.7	
Black	34.6	42.0	31.5	
Other	6.5	5.8	6.8	
Age group				<0.001
20-44	13.9	16.4	11.8	
45-64	40.9	43.5	39.8	
65+	45.2	40.2	47.4	
ESRD vintage				<0.001
1-2 years	37.7	16.6	46.7	
3-4 years	24.0	29.6	21.6	
5+ years	38.3	53.8	31.7	
Insurance type				<0.001
Part AB and D	31.8	100.0	2.62	
Part AB only	12.6	0.0	18.0	
Part D only	15.9	0.0	22.6	
Other	39.8	0.0	56.8	
Residential area				<0.001
Large metropolitan	55.3	51.3	57.0	
Medium/small metropolitan	28.4	29.7	27.9	
Non-metropolitan	16.3	19.0	15.1	
Nursing home residence†	8.4	11.5	7.1	<0.001
Cancer‡	7.4	5.4	8.2	<0.001
Prior pain-related hospitalization in 2010	4.5	6.7	3.6	<0.001
Number of prior hospitalizations in 2010				<0.001
0	49.5	41.9	52.8	
1-2	31.4	34.5	30.1	
3-4	11.5	13.4	10.7	
5 or more	7.5	10.2	6.4	
Smoker	6.1	6.8	5.8	<0.001
Congestive heart failure	26.7	25.2	27.4	<0.001
Peripheral vascular disease	11.1	9.8	11.6	<0.001
Cerebrovascular disease	7.7	7.4	7.9	<0.001
Chronic obstructive pulmonary disease	6.4	5.2	7.0	<0.001
Atherosclerotic heart disease	17.7	15.5	18.7	<0.001
Diabetes	55.4	54.4	55.8	<0.001
AIDS	0.7	1.0	0.6	<0.001

Note: Values expressed as percent.

Chi square test for comparison

\* Please refer to Figure 1 for inclusion criteria

† Based on one or more claims in physician/carrier files

‡ Based on one or more inpatient stays with a cancer diagnosis and Form 2728

**Supplemental Table 2. Dialysis patient characteristics by status of opioid prescription\* in 2010 patients without any opioid filled from July 1, 2009 to December 31, 2009**

Characteristics	All (n = 62,228)	Non-user (n = 36,026)	Short-term prescription (n = 24,346)	Chronic prescription (n=1,856)	P-value for overall comparison
Opioid prescription					<0.001
<20 MME/day		-	18.5	34.2	
20-50 MME/day		-	56.1	45.2	
50+ MME/day		-	25.4	20.7	
Male sex	56.3	59.0	52.8	50.3	<0.001¶
Race					<0.001
White	51.8	52.4	50.9	52.4	
Black	40.8	39.0	43.1	43.5	
Other	7.4	8.6	6.0	4.1	
Age group					<0.001
20-44	15.0	13.9	16.7	15.2	
45-64	40.5	39.2	41.9	45.6	
65+	44.5	46.9	41.4	39.2	
ESRD year					0.002††
1-2 years	6.3	6.2	6.5	5.8	
3-4 years	32.7	33.3	31.8	34.2	
5+ years	61.0	60.5	61.7	60.0	
Dialysis modality					0.002**
Hemodialysis	94.1	94.1	94.0	96.0	
Peritoneal dialysis	5.9	5.9	6.0	4.0	
History of kidney transplantation	7.7	7.1	8.5	7.5	<0.001††
Analgesic prescription	11.3	8.4	14.9	22.3	<0.001
Dual status†	66.4	63.7	69.7	75.7	<0.001
Residential area					<0.001¶
Large metropolitan	55.1	57.4	52.1	50.0	
Medium/small metropolitan	27.9	26.8	29.2	30.1	
Non-metropolitan	17.1	15.8	18.7	19.9	
Nursing home residence‡	9.4	8.4	10.4	17.1	<0.001
Cancer§	5.2	4.8	5.6	6.4	<0.001¶
Prior pain-related hospitalization	3.4	1.9	5.1	11.3	<0.001
Number of prior hospitalizations					<0.001
0	49.6	59.4	36.8	27.6	
1-2	33.4	29.6	39.0	35.3	
3-4	10.7	7.4	14.9	19.5	
5 or more	6.3	3.6	9.3	17.6	
Smoker	5.2	4.8	5.5	8.6	<0.001
Congestive heart failure	24.0	23.8	24.0	27.2	0.004**
Peripheral vascular disease	8.9	8.8	8.9	10.0	0.20
Cerebrovascular disease	7.2	7.2	7.1	7.1	0.90
Chronic obstructive pulmonary disease	4.0	3.9	4.1	5.7	<0.001**
Atherosclerotic heart disease	15.0	15.3	14.3	17.7	<0.001
Diabetes	52.2	51.4	53.0	58.0	<0.001
AIDS	0.9	0.8	0.9	1.0	0.42

Abbreviations: MME, morphine milligram equivalent.

Note: Values expressed as percent.

Chi square test for overall (3-group) and 3-pair (non-user vs. short-term prescription; non-user vs. chronic prescription; short-term prescription vs. chronic prescription) comparisons.

Statistical significance was defined as  $p < 0.017$  using two-tailed tests, based on Bonferroni method for paired, multiple comparison.

\* Short-term: 1- to 89-day supply within study year; chronic: 90-day or more supply within study year

† Dual status in Medicare and Medicaid

‡ Based on one or more claims in physician/carrier files

§ Based on one or more inpatient stays with a cancer diagnosis and Form 2728

¶ The difference between short-term prescription and chronic prescription was not significant; other comparisons were significant

\*\* The difference between non-users and short-term prescription was not significant; other comparisons were significant

†† The differences between non-users and chronic prescription and between short-term prescription and chronic prescription were not significant; the difference between non-users and short-term prescription was significant

**Supplemental Table 3. Adjusted hazard ratios of death, discontinued dialysis, and hospitalization in 2011-2012, associated with 2010 prescription for  $\geq 90$  days of an opioid in 2010 patients without any opioid filled from July 1, 2009 to December 31, 2009 (n = 60,579)**

Characteristics	Outcome = death			Outcome = discontinued dialysis			Outcome = hospitalization		
	HR	(95% CI)	P value	HR	(95% CI)	P value	HR	(95% CI)	P value
Opioid prescription*									
None	1.00			1.00			1.00		
Short term	1.01	(0.97, 1.04)	0.67	1.04	(0.93, 1.16)	0.48	1.07	(1.05, 1.10)	<0.001
Chronic, <20 MME/day	1.12	(0.97, 1.29)	0.13	1.27	(0.82, 1.97)	0.28	1.26	(1.16, 1.38)	<0.001
Chronic, 20-50 MME/day	1.32	(1.17, 1.48)	<0.001	1.53	(1.06, 2.21)	0.02	1.28	(1.19, 1.38)	<0.001
Chronic, 50+ MME/day	1.46	(1.24, 1.71)	<0.001	0.92	(0.49, 1.72)	0.79	1.25	(1.12, 1.40)	<0.001
Analgesic prescription									
No	1.00			1.00			1.00		
Yes	0.98	(0.94, 1.03)	0.49	1.03	(0.87, 1.21)	0.76	1.04	(1.01, 1.07)	0.007
Gender									
Female	1.00			1.00			1.00		
Male	1.11	(1.08, 1.15)	<0.001	0.90	(0.81, 1.00)	0.06	0.94	(0.93, 0.96)	<0.001
Race									
White	1.00			1.00			1.00		
Black	0.84	(0.81, 0.87)	<0.001	0.65	(0.58, 0.74)	<0.001	0.96	(0.94, 0.98)	<0.001
Other	0.93	(0.88, 0.99)	0.03	0.66	(0.52, 0.84)	<0.001	0.92	(0.89, 0.96)	<0.001
Age group									
20-44	1.00			1.00			1.00		
45-64	2.10	(1.94, 2.28)	<0.001	2.40	(1.66, 3.46)	<0.001	1.08	(1.04, 1.11)	<0.001
65+	3.90	(3.59, 4.22)	<0.001	8.38	(5.86, 12.0)	<0.001	1.28	(1.24, 1.32)	<0.001
ESRD vintage									
1-2 years	1.00			1.00			1.00		
3-4 years	1.09	(1.02, 1.16)	0.01	1.01	(0.83, 1.22)	0.96	1.04	(1.00, 1.08)	0.04
5+ years	1.25	(1.17, 1.33)	<0.001	1.04	(0.86, 1.25)	0.70	1.07	(1.03, 1.11)	0.001
Dialysis modality									
Hemodialysis	1.00			1.00			1.00		
Peritoneal dialysis	1.36	(1.27, 1.46)	<0.001	1.20	(0.95, 1.50)	0.12	1.20	(1.16, 1.25)	<0.001
History of kidney transplantation									
No	1.00			1.00			1.00		
Yes	0.85	(0.78, 0.93)	<0.001	0.50	(0.34, 0.74)	<0.001	0.98	(0.94, 1.01)	0.21
Dual status†									
No	1.00			1.00			1.00		
Yes	0.90	(0.87, 0.94)	<0.001	0.73	(0.65, 0.81)	<0.001	1.01	(0.99, 1.03)	0.56
Residential area									
Large	1.00			1.00			1.00		
Medium/small	1.01	(0.97, 1.05)	0.62	1.69	(1.50, 1.90)	<0.001	0.97	(0.95, 0.99)	0.004
Non-metro	1.08	(1.03, 1.12)	0.001	1.79	(1.57, 2.05)	<0.001	0.90	(0.88, 0.93)	<0.001
Nursing home residence‡									
No	1.00			1.00			1.00		
Yes	1.60	(1.53, 1.67)	<0.001	2.47	(2.16, 2.81)	<0.001	1.15	(1.11, 1.18)	<0.001

Cancer§									
No	1.00			1.00			1.00		
Yes	1.24	(1.17, 1.31)	<0.001	1.47	(1.24, 1.73)	<0.001	1.02	(0.98, 1.06)	0.31
Prior pain-related hospitalization in 2010									
No	1.00			1.00			1.00		
Yes	0.93	(0.86, 1.00)	0.06	0.84	(0.64, 1.11)	0.22	1.13	(1.07, 1.18)	<0.001
Number of prior hospitalizations in 2010									
0	1.00			1.00			1.00		
1-2	1.59	(1.53, 1.65)	<0.001	1.38	(1.22, 1.56)	<0.001	1.59	(1.56, 1.62)	<0.001
3-4	2.25	(2.14, 2.36)	<0.001	1.78	(1.51, 2.10)	<0.001	2.39	(2.31, 2.46)	<0.001
5 or more	3.14	(2.96, 3.32)	<0.001	2.86	(2.37, 3.45)	<0.001	3.64	(3.50, 3.78)	<0.001
Smoker									
No	1.00			1.00			1.00		
Yes	1.12	(1.04, 1.21)	0.002	1.33	(1.06, 1.67)	0.01	1.08	(1.03, 1.13)	<0.001
Congestive heart failure									
No	1.00			1.00			1.00		
Yes	1.24	(1.19, 1.28)	<0.001	0.99	(0.88, 1.12)	0.88	1.08	(1.05, 1.10)	<0.001
Peripheral vascular disease									
No	1.00			1.00			1.00		
Yes	1.09	(1.03, 1.14)	0.001	1.12	(0.96, 1.31)	0.15	1.00	(0.97, 1.03)	0.96
Cerebrovascular disease									
No	1.00			1.00			1.00		
Yes	1.04	(0.98, 1.10)	0.16	1.32	(1.12, 1.55)	<0.001	1.06	(1.03, 1.10)	<0.001
Chronic obstructive pulmonary disease									
No	1.00			1.00			1.00		
Yes	1.12	(1.05, 1.20)	<0.001	1.01	(0.81, 1.25)	0.96	1.11	(1.06, 1.17)	<0.001
Atherosclerotic heart disease									
No	1.00			1.00			1.00		
Yes	1.18	(1.13, 1.23)	<0.001	1.02	(0.89, 1.17)	0.76	1.11	(1.08, 1.14)	<0.001
Diabetes									
No	1.00			1.00			1.00		
Yes	1.18	(1.14, 1.23)	<0.001	0.87	(0.78, 0.97)	0.01	1.13	(1.11, 1.16)	<0.001
AIDS									
No	1.00			1.00			1.00		
Yes	1.06	(0.85, 1.32)	0.61	1.45	(0.65, 3.26)	0.37	1.16	(1.05, 1.29)	0.003

Abbreviations: HR, hazard ratio; CI, confidence interval; MME, morphine milligram equivalent.

\* Short term: 1- to 89-day filled prescription supply within study year; chronic: 90-day or more filled prescription supply within study year

† Dual status in Medicare and Medicaid

‡ Based on one or more claims in physician/carrier files

§ Based on one or more inpatient stay with a cancer diagnosis and Form 2728

**Supplemental Table 4. Dialysis patient characteristics by drug group\* in 2010 patients without any opioid or analgesic filled from July 1, 2009 to December 31, 2009**

Characteristics	All (n = 26,411)	New opioid user (n = 23,311)	New analgesic user (n = 3,100)	P-value
Male sex	53.0	53.1	51.8	0.16
Race				<0.001
White	51.2	51.1	52.7	
Black	42.7	43.4	37.0	
Other	6.1	5.5	10.3	
Age group				<0.001
20-44	16.4	17.2	10.0	
45-64	41.9	42.2	39.8	
65+	41.7	40.6	50.2	
ESRD year				0.01
1-2 years	6.7	6.5	7.9	
3-4 years	32.0	32.0	32.1	
5+ years	61.3	61.5	60.0	
Dialysis modality				0.01
Hemodialysis	94.1	94.0	95.1	
Peritoneal dialysis	5.9	6.0	4.9	
History of kidney transplantation	8.2	8.6	5.5	<0.001
Dual status†	69.6	69.1	73.0	<0.001
Residential area				<0.001
Large metropolitan	52.3	51.3	59.9	
Medium/small metropolitan	29.2	29.7	25.2	
Non-metropolitan	18.5	19.0	14.9	
Nursing home residence‡	10.8	10.8	10.2	0.32
Cancer§	5.6	5.7	5.1	0.15
Prior pain-related hospitalization	5.2	5.4	3.6	<0.001
Number of prior hospitalizations				<0.001
0	37.8	36.2	49.9	
1-2	38.2	38.7	34.4	
3-4	14.7	15.4	10.0	
5 or more	9.3	9.7	5.7	
Smoker	5.6	5.8	4.2	<0.001
Congestive heart failure	24.2	24.3	23.7	0.48
Peripheral vascular disease	9.0	8.9	9.5	0.34
Cerebrovascular disease	7.1	7.2	6.8	0.39
Chronic obstructive pulmonary disease	4.2	4.3	3.8	0.20
Atherosclerotic heart disease	14.5	14.4	15.6	0.08
Diabetes	53.6	52.7	60.3	<0.001
AIDS	0.9	0.9	0.9	0.71

Note: Values expressed as percent.

\* New opioid users or new analgesic users

† Dual status in Medicare and Medicaid

‡ Based on one or more claims in physician/carrier files

§ Based on one or more inpatient stays with a cancer diagnosis and Form 2728

**Supplemental Table 5. Adjusted hazard ratios of death, discontinued dialysis, and hospitalization in 2011-2012, associated with 2010 new drug prescription\* in 2010 patients without any opioid or analgesic filled from July 1, 2009 to December 31, 2009 (n = 25,686)**

Characteristics	Outcome = death			Outcome = discontinued dialysis			Outcome = hospitalization		
	HR	(95% CI)	P value	HR	(95% CI)	P value	HR	(95% CI)	P value
New prescription									
Analgesic	1.00			1.00			1.00		
Opioid	1.06	(0.99, 1.14)	0.12	0.90	(0.71, 1.13)	0.36	1.01	(0.96, 1.05)	0.83
Gender									
Female	1.00			1.00			1.00		
Male	1.08	(1.03, 1.14)	<0.001	0.89	(0.76, 1.04)	0.14	0.97	(0.95, 1.00)	0.05
Race									
White	1.00			1.00			1.00		
Black	0.81	(0.77, 0.86)	<0.001	0.60	(0.50, 0.72)	<0.001	0.98	(0.95, 1.01)	0.21
Other	0.90	(0.82, 0.99)	0.04	0.65	(0.45, 0.95)	0.03	0.94	(0.89, 1.00)	0.06
Age group									
20-44	1.00			1.00			1.00		
45-64	2.00	(1.80, 2.22)	<0.001	2.46	(1.51, 4.00)	<0.001	1.09	(1.04, 1.13)	<0.001
65+	3.64	(3.27, 4.05)	<0.001	7.96	(4.94, 12.8)	<0.001	1.27	(1.22, 1.34)	<0.001
ESRD vintage									
1-2 years	1.00			1.00			1.00		
3-4 years	1.07	(0.98, 1.18)	0.13	0.97	(0.73, 1.27)	0.80	1.08	(1.02, 1.15)	0.01
5+ years	1.24	(1.14, 1.36)	<0.001	1.10	(0.84, 1.44)	0.49	1.10	(1.04, 1.16)	0.002
Dialysis modality									
Hemodialysis	1.00			1.00			1.00		
Peritoneal dialysis	1.36	(1.24, 1.50)	<0.001	1.37	(1.00, 1.88)	0.05	1.24	(1.17, 1.31)	<0.001
History of kidney transplantation									
No	1.00			1.00			1.00		
Yes	0.78	(0.69, 0.88)	<0.001	0.48	(0.28, 0.83)	0.01	0.95	(0.90, 1.00)	0.07
Dual status†									
No	1.00			1.00			1.00		
Yes	0.89	(0.85, 0.94)	<0.001	0.69	(0.59, 0.82)	<0.001	1.00	(0.97, 1.03)	0.93
Residential area									
Large	1.00			1.00			1.00		
Medium/small	1.07	(1.01, 1.13)	0.02	1.74	(1.46, 2.08)	<0.001	0.98	(0.95, 1.01)	0.14
Non-metro	1.13	(1.07, 1.20)	<0.001	1.96	(1.61, 2.38)	<0.001	0.90	(0.86, 0.93)	<0.001
Nursing home residence‡									
No	1.00			1.00			1.00		
Yes	1.57	(1.48, 1.67)	<0.001	2.34	(1.94, 2.83)	<0.001	1.13	(1.08, 1.18)	<0.001
Cancer§									
No	1.00			1.00			1.00		
Yes	1.28	(1.18, 1.39)	<0.001	1.25	(0.97, 1.61)	0.09	1.02	(0.97, 1.09)	0.44
Prior pain-related hospitalization in 2010									
No	1.00			1.00			1.00		
Yes	0.92	(0.83, 1.01)	0.08	0.91	(0.66, 1.25)	0.56	1.07	(1.01, 1.14)	0.02

Number of prior hospitalizations in 2010									
0	1.00			1.00			1.00		
1-2	1.47	(1.39, 1.56)	<0.001	1.26	(1.03, 1.53)	0.02	1.44	(1.40, 1.49)	<0.001
3-4	2.02	(1.89, 2.17)	<0.001	1.75	(1.39, 2.21)	<0.001	2.04	(1.96, 2.13)	<0.001
5 or more	2.92	(2.71, 3.16)	<0.001	2.88	(2.23, 3.72)	<0.001	2.81	(2.66, 2.96)	<0.001
Smoker									
No	1.00			1.00			1.00		
Yes	1.17	(1.06, 1.29)	0.002	1.43	(1.04, 1.96)	0.03	1.07	(1.00, 1.13)	0.04
Congestive heart failure									
No	1.00			1.00			1.00		
Yes	1.24	(1.18, 1.31)	<0.001	0.98	(0.82, 1.18)	0.85	1.08	(1.04, 1.11)	<0.001
Peripheral vascular disease									
No	1.00			1.00			1.00		
Yes	1.12	(1.04, 1.20)	0.003	1.20	(0.95, 1.51)	0.12	0.96	(0.91, 1.01)	0.09
Cerebrovascular disease									
No	1.00			1.00			1.00		
Yes	1.02	(0.95, 1.11)	0.56	1.21	(0.95, 1.55)	0.13	1.05	(1.00, 1.11)	0.08
Chronic obstructive pulmonary disease									
No	1.00			1.00			1.00		
Yes	1.06	(0.96, 1.16)	0.27	1.05	(0.77, 1.43)	0.75	1.10	(1.02, 1.17)	0.01
Atherosclerotic heart disease									
No	1.00			1.00			1.00		
Yes	1.17	(1.11, 1.25)	<0.001	1.06	(0.87, 1.29)	0.58	1.10	(1.05, 1.14)	<0.001
Diabetes									
No	1.00			1.00			1.00		
Yes	1.15	(1.10, 1.21)	<0.001	0.79	(0.67, 0.93)	0.004	1.10	(1.07, 1.13)	<0.001
AIDS									
No	1.00			1.00			1.00		
Yes	1.01	(0.74, 1.38)	0.95	2.95	(1.30, 6.71)	0.01	1.11	(0.96, 1.28)	0.17

Abbreviations: HR, hazard ratio; CI, confidence interval.

\* New opioid or new analgesic prescriptions

† Dual status in Medicare and Medicaid

‡ Based on one or more claims in physician/carrier files

§ Based on one or more inpatient stay with a cancer diagnosis and Form 2728



**Supplemental Table 6. List of opioid medications**

Medications
GUAIFENESIN/HYDROCODONE BIT
HYDROCODONE BIT
HYDROCODONE BIT/ACETAMINOPHEN
HYDROCODONE BIT/HOMATROPINE
HYDROCODONE TANNATE/CHLOR-TAN
HYDROCODONE/CHLORPHEN POLIS
HYDROCODONE/IBUPROFEN
P-EPD TAN/HYDROCODONE TANNATE
P-EPHED HCL/HYDROCODONE BIT
P-EPHED HCL/HYDROCODONE/BPM
P-EPHED HCL/HYDROCODONE/CP
P-EPHED HCL/HYDROCODONE/TRIPRO
PE/HYDROCODONE/DEXBROMPHENIRMIN
PHENYLEPHRINE HCL/HYDROCODONE
PHENYLEPHRINE/HYDROCODONE/BPM
PHENYLEPHRINE/HYDROCODONE/CP
PHENYLEPHRINE/HYDROCODONE/D-CP
PHENYLEPHRINE/HYDROCODONE/DPHA
PHENYLEPHRINE/HYDROCODONE/PYR
POT GUAIAICO/HYDROCODONE BIT
PPA HCL/HYDROCODONE BIT
IBUPROFEN/OXYCODONE HCL
OXYCODONE HCL
OXYCODONE HCL/ACETAMINOPHEN
OXYCODONE HCL/ASPIRIN
OXYCODONE HCL/OXYCODON TER/ASA
PROPOXYPHENE HCL
PROPOXYPHENE HCL/ACETAMINOPHEN
PROPOXYPHENE HCL/ASA/CAFFEINE
PROPOXYPHENE NAPSYL
PROPOXYPHENE/ACETAMINOPHEN
TRAMADOL HCL
TRAMADOL HCL/ACETAMINOPHEN
ACETAMINOPHEN WITH CODEINE
ASPIRIN/CODEINE PHOSPHATE
BROMPHENIRAMIN/PE/CODEINE PHOS
CHLORPHENIRAMINE/CODEINE PHOS
CODEINE PHOS/CARISOPRODOL/ASA
CODEINE PHOSPHATE
CODEINE SULF
CODEINE/BUTALBIT/ACETAMIN/CAFF
CODEINE/BUTALBITAL/ASA/CAFFEIN

CODEINE/PROMETHAZINE HCL  
DIPHENHYDRAMIN/PE/CODEINE PHOS  
GUAIFENESIN/CODEINE PHOS  
P-EPHED HCL/CODEINE/GUAIFEN  
MORPHINE SULFATE  
MORPHINE SULFATE/NALTREXONE  
HYDROMORPHONE HCL  
METHADONE HCL  
MEPERIDINE HCL  
OXYMORPHONE HCL  
BUPRENORPHINE HCL  
BUPRENORPHINE HCL/NALOXONE HCL  
TAPENTADOL HYDROCHLORIDE  
FENTANYL  
FENTANYL CITRATE

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**Supplemental Table 7. List of analgesic medications**

Medications
ACETAM/PAMABRM/MAG/E/FA/BCOMPC
ACETAMIN/CALCIUM CARB/MAG/CAFF
ACETAMINOPHEN
ACETAMINOPHEN/BROMELAINS
ACETAMINOPHEN/BUTALBITAL
ACETAMINOPHEN/CAFFEINE
ACETAMINOPHEN/CAFFEINE/BUTALB
ACETAMINOPHEN/CALCIUM CARB
ACETAMINOPHEN/CHLOR-MAL
ACETAMINOPHEN/CHLORPHENIRAMINE
ACETAMINOPHEN/D-BROMPHENIRAMIN
ACETAMINOPHEN/DP-HYDRAM HCL
ACETAMINOPHEN/MAG SAL/PAMABROM
ACETAMINOPHEN/MELATONIN
ACETAMINOPHEN/PAMABROM
ACETAMINOPHEN/PHENYLTOLOX/CAFF
ACETAMINOPHEN/PHENYLTOLX CIT
ACETAMINOPHEN/PYRILAM/PAMABROM
ACETAMINOPHEN/PYRILAMINE MAL
ACETAMINOPHN/CAL CB/CAFF/GLYC
ACETAMINOPHN/PYR MA/PAMABROM
ACETAMINOPHN/PYRIL MAL/CAFFEIN
ACETAMINOPHN/SOD BICARB/CIT AC
ANTIPYRINE
APAP/CALCIUM CARB/MAGNESIUM
APAP/PYRIL MAL/PAMABROM
ASA/ACETAMINOPHEN/CAFFEINE/CAL
ASA/ACETAMINOPHN/CAFFEIN/POT
ASA/ACETAMINOPHN/MAG/ALH/CAFF
ASA/APAP/MAGNESIUM/ALH/CAFFEIN
ASA/CALCIUM CARB/MAG/AL HYDROX
ASA/CALCIUM CARB/MAGNESIUM/ALH
ASA/DP-HYDRAMINE/SOD BICARB/CA
ASA/MAG HYDROX/AL HYDROX/CAFF
ASA/PHENACET/CAFFEINE/ALLOBARB
ASA/SAL-AMIDE/APAP/AL HYDROX
ASA/SAL-AMIDE/APAP/CAFFEIN
ASA/SALICYLAM/ACETAMINOPH/CAFF
ASPIRIN
ASPIRIN/ACETAMINOPHEN
ASPIRIN/ACETAMINOPHEN/CAFFEINE
ASPIRIN/ACETAMINOPHEN/CAL CARB
ASPIRIN/ACETAMINOPHEN/PHENACET
ASPIRIN/APAP/AL HYDROX/CAFFEIN

ASPIRIN/BUTALBITAL  
ASPIRIN/CAFFEINE  
ASPIRIN/CAFFEINE/BUTALBITAL  
ASPIRIN/CALCIUM CARB/MAGNESIUM  
ASPIRIN/CALCIUM CARBONATE  
ASPIRIN/CHLOR-MAL  
ASPIRIN/DIPHENHYDRAMINE CITRAT  
ASPIRIN/DIPHENHYDRAMINE HCL  
ASPIRIN/MAG CARB/AL AMINOACET  
ASPIRIN/MAG HYDROX/AL HYDROX  
ASPIRIN/MEPROBAMATE  
ASPIRIN/SALICYLAMIDE/CAFFEINE  
ASPIRIN/SOD BICARB/CITRIC ACID  
BROMFENAC SODIUM  
BROMPHENIRAMINE/ACETAMINOPHEN  
BUTALB/ACETAMINOPHEN/CAFFEINE  
BUTALBITAL/ACETAMINOPHEN  
BUTALBITAL/ASPIRIN/CAFFEINE  
CELECOXIB  
CELECOXIB/CAPSAICIN/MENTHOL  
CELECOXIB/LIDOCAINE/MENTHOL  
CHLORPHEN/PSEUDOEPH/IBUPROFEN  
CHOL SAL/MAGNESIUM SALICYLATE  
CHOLINE SALICYLATE  
DICLOFEN SOD/KINESIOLOGY TAPE  
DICLOFENAC EPOLAMINE  
DICLOFENAC POTASSIUM  
DICLOFENAC SODIUM  
DICLOFENAC/BENZALKONIUM CHLOR  
DICLOFENAC/CAPSICUM  
DIFLUNISAL  
ETHYL HEXYL SALICYLATE  
ETODOLAC  
FENOPROFEN CALCIUM  
FLURBIPROFEN  
FLURBIPROFEN SODIUM  
HC/PRAMOXINE HCL/CHLOROXYLENOL  
IBUPROFEN  
IBUPROFEN LYSINE/PF  
IBUPROFEN/DIPHENHYDRAMINE CIT  
IBUPROFEN/DIPHENHYDRAMINE HCL  
IBUPROFEN/FAMOTIDINE  
IBUPROFEN/P-EPHED HCL/CP  
IBUPROFEN/PHENYLEPHRINE HCL  
IBUPROFEN/PSEUDOEPHEDRINE HCL  
INDOMETHACIN  
INDOMETHACIN SODIUM

INDOMETHACIN SODIUM TRIHYDRATE  
ISOMETHEPT/ACETAMINOP/DICHLPHN  
ISOMETHEPTEN/CAF/ACETAMINOPHEN  
ISOMETHEPTENE/APAP/CAFFEIN  
ISOMETHEPTENE/APAP/DICHLPHEN  
KETOPROFEN  
KETOROLAC TROMETHAMINE  
LANSOPRAZOLE/NAPROXEN  
MAGNESIUM SALICYLATE  
MAGNESIUM SALICYLATE/CAFFEINE  
MECLOFENAMATE SODIUM  
MEFENAMIC ACID  
MELOXICAM  
ME-SAL/GLUCOS/MSM/CAY/MEN/ALOE  
ME-SALICYLATE/ACET/ISOPROPANOL  
ME-SALICYLATE/GUAIA/PET,WH  
ME-SALICYLATE/MENTH/CAMPH/PEP  
METHYL SALICYLATE  
METHYL SALICYLATE/ISOPROPANOL  
METHYL SALICYLATE/MENTH/CAMPH  
METHYL SALICYLATE/MENTHOL  
MG SAL/ACETAMINOPHN/P-TLOX/CAF  
MG SALICYLATE/ACETAMINOPH/CAFF  
MG SALICYLATE/ACETAMINOPHEN  
MG SALICYLATE/DP-HYDRAM HCL  
MG SALICYLATE/PHENYLTOLX CIT  
NA SALICYLATE/THEOBROM/CA/HERB  
NABUMETONE  
NAPROXEN  
NAPROXEN SOD-DIPHENHYDRAM HCL  
NAPROXEN SODIUM  
NAPROXEN SODIUM/MENTHOL  
NAPROXEN SODIUM/P-EPHED HCL  
NAPROXEN/CAPSAICIN/MENTHOL  
NAPROXEN/ESOMEPRAZOLE MAG  
NEPAFENAC  
OXAPROZIN  
PHENACETIN  
PHENYL SALICYLATE  
PHENYLBUTAZONE  
PHENYLEPHRINE/ACETAMINOPH/CAFF  
PIROXICAM  
ROFECOXIB  
SAL-AMIDE/ACETAMINOPHN/CAFFEIN  
SAL-AMIDE/ACETAMINOPHN/ETHAVER  
SAL-AMIDE/ACETAMINOPHN/P-TLOX  
SAL-AMIDE/POT NIT/CAFFEIN/BJPA

SALICYLAMIDE  
SALICYLAMIDE/ACETAMINOPHEN  
SALSALATE  
SODIUM SALICYLATE  
SODIUM THIOSALICYLATE  
SULINDAC  
SUPROFEN  
TOLMETIN SODIUM  
TROLAMINE SALICYLATE  
TROLAMINE SALICYLATE/MENTHOL  
VALDECOXIB  
ZICONOTIDE ACETATE

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**Supplemental Table 8. ICD-9-CM codes used to identify cancer- and pain-related hospitalization**

<b>Disease</b>	<b>ICD-9-CM codes</b>	<b>Description</b>
Cancer	140.XX	Malignant neoplasm of lip
	141.XX	Malignant neoplasm of tongue
	142.XX	Malignant neoplasm of major salivary glands
	143.XX	Malignant neoplasm of gum
	144.XX	Malignant neoplasm of floor of mouth
	145.XX	Malignant neoplasm of other and unspecified parts of mouth
	146.XX	Malignant neoplasm of oropharynx
	147.XX	Malignant neoplasm of nasopharynx
	148.XX	Malignant neoplasm of hypopharynx
	149.XX	Malignant neoplasm of other and ill-defined sites within the lip, oral cavity, and pharynx
	150.XX	Malignant neoplasm of esophagus
	151.XX	Malignant neoplasm of stomach
	152.XX	Malignant neoplasm of small intestine, including duodenum
	153.XX	Malignant neoplasm of colon
	154.XX	Malignant neoplasm of rectum, rectosigmoid junction, and anus
	155.XX	Malignant neoplasm of liver and intrahepatic bile ducts
	156.XX	Malignant neoplasm of gallbladder and extrahepatic bile ducts
	157.XX	Malignant neoplasm of pancreas
	158.XX	Malignant neoplasm of retroperitoneum and peritoneum
	159.XX	Malignant neoplasm of other and ill-defined sites within the digestive organs and peritoneum
	160.XX	Malignant neoplasm of nasal cavities, middle ear, and accessory sinuses
	161.XX	Malignant neoplasm of larynx
	162.XX	Malignant neoplasm of trachea, bronchus, and lung
	163.XX	Malignant neoplasm of pleura
	164.XX	Malignant neoplasm of thymus, heart, and mediastinum
	165.XX	Malignant neoplasm of other and ill-defined sites within the respiratory system and intrathoracic organs
	170.XX	Malignant neoplasm of bone and articular cartilage
	171.XX	Malignant neoplasm of connective and other soft tissue
	172.XX	Malignant melanoma of skin
	173.XX	Other and unspecified malignant neoplasm of skin
	174.XX	Malignant neoplasm of female breast
	175.XX	Malignant neoplasm of male breast
	176.XX	Kaposi's sarcoma
	179.XX	Malignant neoplasm of uterus, part unspecified
	180.XX	Malignant neoplasm of cervix uteri
181.XX	Malignant neoplasm of placenta	
182.XX	Malignant neoplasm of body of uterus	
183.XX	Malignant neoplasm of ovary and other uterine adnexa	
184.XX	Malignant neoplasm of other and unspecified female genital organs	
185.XX	Malignant neoplasm of prostate	
186.XX	Malignant neoplasm of testis	
187.XX	Malignant neoplasm of penis and other male genital organs	

	188.XX	Malignant neoplasm of bladder
	189.XX	Malignant neoplasm of kidney and other and unspecified urinary organs
	190.XX	Malignant neoplasm of eye
	191.XX	Malignant neoplasm of brain
	192.XX	Malignant neoplasm of other and unspecified parts of nervous system
	193.XX	Malignant neoplasm of thyroid gland
	194.XX	Malignant neoplasm of other endocrine glands and related structures
	195.XX	Malignant neoplasm of other and ill-defined sites
	196.XX	Secondary and unspecified malignant neoplasm of lymph nodes
	197.XX	Secondary malignant neoplasm of respiratory and digestive systems
	198.XX	Secondary malignant neoplasm of other specified sites
	199.XX	Malignant neoplasm without specification of site
	200.XX	Lymphosarcoma and reticulosarcoma and other specified malignant tumors of lymphatic tissue
	201.XX	Hodgkin's disease
	202.XX	Other malignant neoplasms of lymphoid and histiocytic tissue
	203.XX	Multiple myeloma and immunoproliferative neoplasms
	204.XX	Lymphoid leukemia
	205.XX	Myeloid leukemia
	206.XX	Monocytic leukemia
	207.XX	Other specified leukemia
	208.XX	Leukemia of unspecified cell type
<hr/>		
Pain	307.80	Psychogenic pain, site unspecified
	338.2X	Chronic pain
	338.3X	Neoplasm related pain (acute) (chronic)
	338.4X	Chronic pain syndrome
	388.70	Otalgia, unspecified
	524.62	Arthralgia of temporomandibular joint
	525.9	Unspecified disorder of the teeth and supporting structures
	569.42	Anal or rectal pain
	607.9	Unspecified disorder of penis
	608.9	Unspecified disorder of male genital organs
	611.71	Mastodynia
	625.9	Unspecified symptom associated with female genital organs
	719.4X	Pain in joint
	723.1	Cervicalgia
	724.2	Lumbago
	724.5	Backache, unspecified
	724.6	Other and unspecified disorders of back: disorders of sacrum
	724.79	Other and unspecified disorders of back: disorders of coccyx, other
	729.1	Myalgia and myositis, unspecified
	729.5	Pain in limb
	733.9	Other and unspecified disorders of bone and cartilage
	780.96	Generalized pain
	784.0	Headache
	784.1	Throat pain
	784.92	Jaw pain



786.5	Chest pain
789.0X	Abdominal pain

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X = 0 to 9 inclusive

ICD-9-CM = International Classification of Diseases, Ninth Revision, Clinical Modification

**Supplemental Table 9. Dialysis patient characteristics by modality on January 1, 2011 in 2010 prevalent cohort**

Characteristics	All (n = 153,758)	Hemodialysis (n = 144,960)	Peritoneal dialysis (n = 8,798)	P-value
Male sex	52.2	52.4	48.8	<0.001
Race				<0.001
White	52.2	51.5	63.8	
Black	42.0	42.8	29.3	
Other	5.8	5.7	6.8	
Age group				<0.001
20-44	16.4	15.7	27.1	
45-64	43.5	43.5	42.1	
65+	40.2	40.7	30.8	
ESRD vintage				<0.001
1-2 years	16.6	16.3	21.4	
3-4 years	29.6	29.4	32.9	
5+ years	53.8	54.3	45.8	
Dual status†	70.9	71.7	58.2	<0.001
Residential area				<0.001
Large metropolitan	51.3	51.9	41.9	
Medium/small metropolitan	29.7	29.4	34.4	
Non-metropolitan	19.0	18.7	23.7	
Nursing home residence‡	11.5	12.0	2.3	<0.001
Cancer§	5.4	5.4	5.7	0.18
Prior pain-related hospitalization in 2010	6.7	6.7	6.1	0.01
Number of prior hospitalizations in 2010				<0.001
0	41.9	41.5	48.6	
1-2	34.5	34.6	34.0	
3-4	13.4	13.5	11.1	
5 or more	10.2	10.4	6.3	
Smoker	6.8	6.8	7.5	0.01
Congestive heart failure	25.2	25.8	16.2	<0.001
Peripheral vascular disease	9.8	9.9	7.2	<0.001
Cerebrovascular disease	7.4	7.5	4.5	<0.001
Chronic obstructive pulmonary disease	5.2	5.3	3.8	<0.001
Atherosclerotic heart disease	15.5	15.7	12.5	<0.001
Diabetes	54.4	55.4	38.8	<0.001
AIDS	1.0	1.0	0.9	0.56

Note: Values expressed as percent.

Chi square test for comparisons.

† Dual status in Medicare and Medicaid

‡ Based on one or more claims in physician/carrier files

§ Based on one or more inpatient stays with a cancer diagnosis and Form 2728

**Supplemental Table 10. Adjusted hazard ratios of death, discontinued dialysis, and hospitalization in 2011-2012, associated with 2010 prescription for  $\geq 90$  days of an opioid in 2010 prevalent hemodialysis cohort (n = 141,120)**

Characteristics	Outcome = death			Outcome = discontinued dialysis			Outcome = hospitalization		
	HR	(95% CI)	P value	HR	(95% CI)	P value	HR	(95% CI)	P value
Opioid prescription*									
None	1.00			1.00			1.00		
Short term	1.04	(1.02, 1.07)	<0.001	1.11	(1.03, 1.20)	0.009	1.12	(1.11, 1.14)	<0.001
Chronic, <20 MME/day	1.16	(1.10, 1.21)	<0.001	1.30	(1.12, 1.50)	<0.001	1.25	(1.22, 1.29)	<0.001
Chronic, 20-50 MME/day	1.25	(1.21, 1.30)	<0.001	1.32	(1.18, 1.48)	<0.001	1.30	(1.27, 1.32)	<0.001
Chronic, 50+ MME/day	1.38	(1.33, 1.44)	<0.001	1.45	(1.28, 1.64)	<0.001	1.39	(1.35, 1.42)	<0.001
Analgesic prescription									
No	1.00			1.00			1.00		
Yes	0.95	(0.93, 0.98)	<0.001	0.92	(0.84, 1.01)	0.09	1.03	(1.01, 1.05)	<0.001
Gender									
Female	1.00			1.00			1.00		
Male	1.11	(1.08, 1.13)	<0.001	0.88	(0.83, 0.95)	<0.001	0.94	(0.93, 0.95)	<0.001
Race									
White	1.00			1.00			1.00		
Black	0.81	(0.80, 0.83)	<0.001	0.62	(0.57, 0.66)	<0.001	0.96	(0.95, 0.97)	<0.001
Other	0.95	(0.90, 0.99)	0.01	0.68	(0.57, 0.80)	<0.001	0.94	(0.91, 0.96)	<0.001
Age group									
20-44	1.00			1.00			1.00		
45-64	1.76	(1.68, 1.83)	<0.001	2.24	(1.85, 2.72)	<0.001	1.05	(1.03, 1.07)	<0.001
65+	3.01	(2.88, 3.14)	<0.001	6.79	(5.62, 8.22)	<0.001	1.20	(1.18, 1.23)	<0.001
ESRD vintage									
1-2 years	1.00			1.00			1.00		
3-4 years	1.14	(1.10, 1.17)	<0.001	0.99	(0.90, 1.08)	0.80	1.07	(1.05, 1.09)	<0.001
5+ years	1.29	(1.25, 1.32)	<0.001	1.00	(0.91, 1.09)	0.93	1.09	(1.08, 1.11)	<0.001
History of kidney transplantation									
No	1.00			1.00			1.00		
Yes	0.88	(0.83, 0.92)	<0.001	0.67	(0.54, 0.83)	<0.001	0.99	(0.96, 1.01)	0.24
Dual status†									
No	1.00			1.00			1.00		
Yes	0.91	(0.89, 0.93)	<0.001	0.76	(0.71, 0.82)	<0.001	1.01	(1.00, 1.03)	0.08
Residential area									
Large	1.00			1.00			1.00		
Medium/small	1.01	(0.99, 1.04)	0.25	1.60	(1.48, 1.72)	<0.001	0.96	(0.95, 0.98)	<0.001
Non-metro	1.10	(1.07, 1.13)	<0.001	1.74	(1.60, 1.89)	<0.001	0.92	(0.90, 0.93)	<0.001
Nursing home residence‡									
No	1.00			1.00			1.00		
Yes	1.57	(1.53, 1.61)	<0.001	2.25	(2.08, 2.43)	<0.001	1.08	(1.06, 1.10)	<0.001
Cancer§									
No	1.00			1.00			1.00		
Yes	1.26	(1.21, 1.30)	<0.001	1.40	(1.26, 1.56)	<0.001	1.04	(1.02, 1.07)	0.002

Prior pain-related hospitalization in 2010										
No	1.00			1.00			1.00			
Yes	0.95	(0.91, 0.99)	0.007	0.98	(0.86, 1.11)	0.73	1.16	(1.13, 1.18)	<0.001	
Number of prior hospitalizations in 2010										
0	1.00			1.00			1.00			
1-2	1.56	(1.52, 1.60)	<0.001	1.41	(1.30, 1.53)	<0.001	1.56	(1.54, 1.59)	<0.001	
3-4	2.17	(2.10, 2.24)	<0.001	1.85	(1.67, 2.04)	<0.001	2.35	(2.31, 2.40)	<0.001	
5 or more	3.03	(2.93, 3.14)	<0.001	2.50	(2.23, 2.79)	<0.001	3.65	(3.57, 3.73)	<0.001	
Smoker										
No	1.00			1.00			1.00			
Yes	1.14	(1.10, 1.19)	<0.001	1.25	(1.10, 1.43)	<0.001	1.08	(1.05, 1.10)	<0.001	
Congestive heart failure										
No	1.00			1.00			1.00			
Yes	1.20	(1.17, 1.23)	<0.001	1.08	(1.00, 1.16)	0.05	1.06	(1.04, 1.07)	<0.001	
Peripheral vascular disease										
No	1.00			1.00			1.00			
Yes	1.07	(1.04, 1.11)	<0.001	1.15	(1.05, 1.26)	0.004	1.02	(1.00, 1.05)	0.02	
Cerebrovascular disease										
No	1.00			1.00			1.00			
Yes	1.02	(0.99, 1.06)	0.21	1.29	(1.17, 1.43)	<0.001	1.03	(1.00, 1.05)	0.02	
Chronic obstructive pulmonary disease										
No	1.00			1.00			1.00			
Yes	1.12	(1.08, 1.16)	<0.001	1.10	(0.98, 1.24)	0.09	1.12	(1.09, 1.15)	<0.001	
Atherosclerotic heart disease										
No	1.00			1.00			1.00			
Yes	1.13	(1.11, 1.16)	<0.001	1.07	(0.98, 1.16)	0.12	1.07	(1.06, 1.09)	<0.001	
Diabetes										
No	1.00			1.00			1.00			
Yes	1.16	(1.13, 1.18)	<0.001	0.87	(0.81, 0.93)	<0.001	1.12	(1.11, 1.14)	<0.001	
AIDS										
No	1.00			1.00			1.00			
Yes	1.20	(1.07, 1.35)	0.002	1.23	(0.75, 2.03)	0.41	1.12	(1.06, 1.19)	<0.001	

Abbreviations: HR, hazard ratio; CI, confidence interval.

\* Short term: 1- to 89-day filled prescription supply within study year; chronic: 90-day or more filled prescription supply within study year

† Dual status in Medicare and Medicaid

‡ Based on one or more claims in physician/carrier files

§ Based on one or more inpatient stay with a cancer diagnosis and Form 2728

**Supplemental Table 11. Adjusted hazard ratios of death, discontinued dialysis, and hospitalization in 2011-2012, associated with 2010 prescription for ≥ 90 days of an opioid in 2010 prevalent peritoneal dialysis cohort (n = 8,637)**

Characteristics	Outcome = death			Outcome = discontinued dialysis			Outcome = hospitalization		
	HR	(95% CI)	P value	HR	(95% CI)	P value	HR	(95% CI)	P value
Opioid prescription*									
None	1.00			1.00			1.00		
Short term	1.08	(0.98, 1.19)	0.13	1.55	(1.11, 2.16)	0.01	1.19	(1.13, 1.26)	<0.001
Chronic, <20 MME/day	1.15	(0.92, 1.44)	0.21	1.70	(0.88, 3.29)	0.11	1.30	(1.14, 1.48)	<0.001
Chronic, 20-50 MME/day	1.39	(1.19, 1.63)	<0.001	2.20	(1.34, 3.61)	0.002	1.26	(1.14, 1.39)	<0.001
Chronic, 50+ MME/day	1.41	(1.19, 1.68)	<0.001	1.79	(1.02, 3.13)	0.04	1.25	(1.13, 1.40)	<0.001
Analgesic prescription									
No	1.00			1.00			1.00		
Yes	1.00	(0.88, 1.14)	0.96	1.30	(0.89, 1.91)	0.18	1.10	(1.02, 1.18)	0.01
Gender									
Female	1.00			1.00			1.00		
Male	1.10	(1.01, 1.20)	0.03	0.79	(0.60, 1.03)	0.08	1.00	(0.95, 1.05)	0.94
Race									
White	1.00			1.00			1.00		
Black	0.85	(0.76, 0.94)	0.002	0.54	(0.36, 0.81)	0.003	1.05	(0.99, 1.11)	0.09
Other	0.77	(0.63, 0.93)	0.006	0.37	(0.15, 0.91)	0.03	0.83	(0.75, 0.91)	<0.001
Age group									
20-44	1.00			1.00			1.00		
45-64	1.98	(1.71, 2.29)	<0.001	2.39	(1.32, 4.33)	0.004	1.02	(0.96, 1.09)	0.48
65+	3.61	(3.08, 4.23)	<0.001	7.31	(3.99, 13.4)	<0.001	1.16	(1.08, 1.26)	<0.001
ESRD vintage									
1-2 years	1.00			1.00			1.00		
3-4 years	1.25	(1.11, 1.40)	<0.001	1.41	(0.99, 2.01)	0.06	1.10	(1.03, 1.17)	0.005
5+ years	1.55	(1.38, 1.75)	<0.001	1.34	(0.92, 1.95)	0.12	1.10	(1.03, 1.18)	0.004
History of Kidney transplantation									
No	1.00			1.00			1.00		
Yes	0.91	(0.76, 1.09)	0.30	0.54	(0.25, 1.20)	0.13	1.05	(0.96, 1.14)	0.31
Dual statut†									
No	1.00			1.00			1.00		
Yes	0.94	(0.86, 1.04)	0.22	0.67	(0.49, 0.91)	0.01	1.04	(0.99, 1.10)	0.12
Residential area									
Large	1.00			1.00			1.00		
Medium/small	1.01	(0.92, 1.12)	0.84	1.35	(0.98, 1.87)	0.07	0.99	(0.94, 1.05)	0.82
Non-metro	1.16	(1.04, 1.29)	0.007	1.48	(1.05, 2.09)	0.03	0.98	(0.92, 1.04)	0.54
Nursing home residence‡									
No	1.00			1.00			1.00		
Yes	1.93	(1.59, 2.35)	<0.001	2.39	(1.38, 4.14)	0.002	1.33	(1.14, 1.55)	<0.001
Cancer§									
No	1.00			1.00			1.00		
Yes	1.25	(1.07, 1.45)	0.005	1.39	(0.92, 2.11)	0.12	1.00	(0.90, 1.11)	0.98

Prior pain-related hospitalization in 2010									
No	1.00			1.00			1.00		
Yes	0.98	(0.82, 1.16)	0.77	0.91	(0.51, 1.61)	0.73	1.17	(1.06, 1.29)	0.003
Number of prior hospitalizations in 2010									
0	1.00			1.00			1.00		
1-2	1.50	(1.35, 1.66)	<0.001	1.45	(1.05, 2.01)	0.02	1.54	(1.45, 1.63)	<0.001
3-4	2.13	(1.87, 2.44)	<0.001	1.69	(1.07, 2.66)	0.03	2.19	(2.02, 2.38)	<0.001
5 or more	3.45	(2.95, 4.03)	<0.001	5.25	(3.28, 8.41)	<0.001	3.21	(2.89, 3.56)	<0.001
Smoker									
No	1.00			1.00			1.00		
Yes	1.02	(0.87, 1.20)	0.78	1.33	(0.82, 2.16)	0.24	0.98	(0.90, 1.08)	0.72
Congestive heart failure									
No	1.00			1.00			1.00		
Yes	1.16	(1.04, 1.29)	0.008	1.09	(0.76, 1.54)	0.65	1.06	(0.99, 1.13)	0.09
Peripheral vascular disease									
No	1.00			1.00			1.00		
Yes	1.26	(1.10, 1.44)	0.001	0.98	(0.61, 1.56)	0.92	1.04	(0.95, 1.15)	0.39
Cerebrovascular disease									
No	1.00			1.00			1.00		
Yes	1.23	(1.04, 1.45)	0.02	1.21	(0.71, 2.08)	0.48	1.10	(0.98, 1.24)	0.09
Chronic obstructive pulmonary disease									
No	1.00			1.00			1.00		
Yes	1.24	(1.04, 1.49)	0.02	1.16	(0.68, 1.98)	0.59	1.21	(1.07, 1.37)	0.003
Atherosclerotic heart disease									
No	1.00			1.00			1.00		
Yes	1.25	(1.11, 1.40)	<0.001	1.01	(0.69, 1.48)	0.96	1.04	(0.96, 1.13)	0.30
Diabetes									
No	1.00			1.00			1.00		
Yes	1.59	(1.45, 1.73)	<0.001	1.01	(0.76, 1.34)	0.97	1.26	(1.20, 1.33)	<0.001
AIDS									
No	1.00			1.00			1.00		
Yes	0.93	(0.53, 1.66)	0.82	1.36	(0.19, 9.95)	0.76	1.07	(0.84, 1.36)	0.61

Abbreviations: HR, hazard ratio; CI, confidence interval.

\* Short term: 1- to 89-day filled prescription supply within study year; chronic: 90-day or more filled prescription supply within study year

† Dual status in Medicare and Medicaid

‡ Based on one or more claims in physician/carrier files

§ Based on one or more inpatient stay with a cancer diagnosis and Form 2728