

eAppendix 1: Illustrative Regression Equations

Model 1:

Adherent to ASMs

$$\begin{aligned} &= \beta_0 + \beta_0(\text{State}) + \beta(\text{ASM Generation and Switch}) + \beta(\text{Race Ethnicity}) + \beta(\text{Age}) + \beta(\text{Sex}) + \beta(\text{Drurality}) \\ &+ \beta(\text{Index Year}) + \beta(\text{ED Q4}) + \beta(\text{Neurologist}) + \beta(\text{HIV AIDS}) + \beta(\text{Alcohol abuse}) + \beta(\text{Deficiency anemia}) \\ &+ \beta(\text{Arthritis}) + \beta(\text{Blood loss}) + \beta(\text{Congestive hearty failure}) + \beta(\text{Chronic lung disease}) + \beta(\text{Coagulopathy}) \\ &+ \beta(\text{Depression}) + \beta(\text{Diabetes}) + \beta(\text{Diabetes with complications}) + \beta(\text{Drug abuse}) + \beta(\text{Hypertension}) \\ &+ \beta(\text{Hypothyroidism}) + \beta(\text{Liver disease}) + \beta(\text{Lymphoma}) + \beta(\text{Electrolyte disorder}) + \beta(\text{Metastatic cancer}) \\ &+ \beta(\text{Obesity}) + \beta(\text{Paralysis}) + \beta(\text{Peripheral vascular disease}) + \beta(\text{Psychoses}) \\ &+ \beta(\text{Pulmonary circulation disorder}) + \beta(\text{Renal failure}) + \beta(\text{Tumor}) + \beta(\text{Ulcer}) + \beta(\text{Valvular disease}) \\ &+ \beta(\text{Weight loss}) + \beta(\text{Injuries}) + \beta(\text{Developmental disabilities}) + \beta(\text{Neurologists per 100,000}) \end{aligned}$$

Model 2:

New Generation ASMs

$$\begin{aligned} &= \beta_0 + \beta_0(\text{State}) + \beta(\text{Race Ethnicity}) + \beta(\text{Age}) + \beta(\text{Sex}) + \beta(\text{Drurality}) + \beta(\text{Index Year}) + \beta(\text{ED Q4}) \\ &+ \beta(\text{Neurologist}) + \beta(\text{HIV AIDS}) + \beta(\text{Alcohol abuse}) + \beta(\text{Deficiency anemia}) + \beta(\text{Arthritis}) + \beta(\text{Blood loss}) \\ &+ \beta(\text{Congestive hearty failure}) + \beta(\text{Chronic lung disease}) + \beta(\text{Coagulopathy}) + \beta(\text{Depression}) + \beta(\text{Diabetes}) \\ &+ \beta(\text{Diabetes with complications}) + \beta(\text{Drug abuse}) + \beta(\text{Hypertension}) + \beta(\text{Hypothyroidism}) + \beta(\text{Liver disease}) \\ &+ \beta(\text{Lymphoma}) + \beta(\text{Electrolyte disorder}) + \beta(\text{Metastatic cancer}) + \beta(\text{Obesity}) + \beta(\text{Paralysis}) \\ &+ \beta(\text{Peripheral vascular disease}) + \beta(\text{Psychoses}) + \beta(\text{Pulmonary circulation disorder}) + \beta(\text{Renal failure}) \\ &+ \beta(\text{Tumor}) + \beta(\text{Ulcer}) + \beta(\text{Valvular disease}) + \beta(\text{Weight loss}) + \beta(\text{Injuries}) + \beta(\text{Developmental disabilities}) \\ &+ \beta(\text{Neurologists per 100,000}) \end{aligned}$$

eTable 1. Models 1 and 2 unadjusted odds ratios and 95% CIs

	Unadjusted OR (95% CI)	
	Model 1	Model 2
ASM Generation		
First Generation	<i>Ref</i>	
Second Generation, Switch	1.00 (0.96, 1.05)	
Second Generation, No Switch	0.66 (0.64, 0.69)	
Third Generation, No Switch	1.81 (0.93, 3.49)	
Third Generation, Switch	0.80 (0.76, 0.85)	
Race/Ethnicity		
White	<i>Ref</i>	<i>Ref</i>
Black	0.63 (0.61, 0.65)	0.73 (0.70, 0.76)
AIAN	0.71 (0.60, 0.85)	1.34 (1.08, 1.67)
Asian	1.08 (0.96, 1.21)	0.76 (0.67, 0.86)
Hispanic	0.83 (0.79, 0.88)	0.96 (0.91, 1.02)
NHOPI	1.17 (1.04, 1.32)	0.68 (0.60, 0.77)
Other	0.97 (0.92, 1.02)	0.92 (0.86, 0.98)

eTable 2. Sensitivity analyses of Model 2, outcome: newer generation ASMs

Adjusted Odds Ratio (95% CI)	Supplemental Model 1: 3rd Generation	Supplemental Model 2: Incident Only*	Supplemental Model 3a: Neurologist Care	Supplemental Model 3b: No Neurologist Care
Race/Ethnicity				
White	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>
Black	0.63 (0.58, 0.68)	0.70 (0.64, 0.77)	0.76 (0.71, 0.82)	0.69 (0.65, 0.73)
AIAN	0.55 (0.37, 0.83)	1.01 (0.60, 1.70)	1.00 (0.64, 1.55)	1.39 (1.05, 1.83)
Asian	1.00 (0.82, 1.22)	1.03 (0.79, 1.36)	1.30 (0.96, 1.76)	0.85 (0.74, 0.99)
Hispanic	0.94 (0.86, 1.03)	0.86 (0.76, 0.96)	0.86 (0.75, 0.99)	0.94 (0.88, 1.00)
NHOPI	1.10 (0.89, 1.36)	0.71 (0.52, 0.97)	0.70 (0.47, 1.05)	0.78 (0.68, 0.89)
Other	0.94 (0.85, 1.04)	0.88 (0.76, 1.01)	1.05 (0.93, 1.18)	0.84 (0.78, 0.92)
Age				
18 to 24	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>
25 to 34	0.90 (0.84, 0.96)	0.68 (0.62, 0.76)	0.81 (0.75, 0.88)	0.68 (0.64, 0.73)
35 to 44	0.79 (0.73, 0.85)	0.48 (0.43, 0.54)	0.69 (0.63, 0.76)	0.51 (0.47, 0.54)
45 to 54	0.61 (0.56, 0.67)	0.41 (0.36, 0.46)	0.57 (0.51, 0.63)	0.43 (0.40, 0.46)
55+	0.51 (0.45, 0.59)	0.37 (0.33, 0.43)	0.50 (0.44, 0.57)	0.38 (0.35, 0.42)
Sex				
Female	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>
Male	1.01 (0.95, 1.06)	0.61 (0.57, 0.66)	0.63 (0.60, 0.67)	0.67 (0.64, 0.70)
Rurality				
Non-Rural	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>
Rural	0.81 (0.76, 0.88)	0.92 (0.82, 1.03)	1.14 (1.05, 1.24)	0.85 (0.80, 0.92)
Missing	3.59 (0.86, 14.95)	----	1.07 (0.12, 9.25)	0.56 (0.08, 3.95)
Index Year				
2010	<i>Ref</i>	----	<i>Ref</i>	<i>Ref</i>
2011	0.54 (0.49, 0.58)	----	0.82 (0.75, 0.89)	0.82 (0.77, 0.87)
2012	0.54 (0.49, 0.59)	----	1.02 (0.92, 1.13)	0.92 (0.86, 0.98)
2013	0.46 (0.41, 0.51)	----	1.11 (1.00, 1.24)	1.11 (1.03, 1.21)
2014	0.34 (0.28, 0.41)	----	1.14 (0.96, 1.35)	1.37 (1.20, 1.56)
Emergency Department Visits				
Quartiles 1 - 3	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>
Quartile 4	1.13 (1.05, 1.21)	1.33 (1.19, 1.49)	1.37 (1.25, 1.50)	1.62 (1.51, 1.73)
Neurologist				
No	<i>Ref</i>	<i>Ref</i>	----	----
Yes	1.73 (1.62, 1.85)	3.07 (2.83, 3.34)	----	----
Comorbidities				
AIDS	0.64 (0.44, 0.92)	1.71 (1.22, 2.41)	1.16 (0.86, 1.58)	1.96 (1.53, 2.50)
Alcohol	0.57 (0.49, 0.66)	0.94 (0.82, 1.09)	0.75 (0.66, 0.85)	0.91 (0.83, 1.00)
Deficiency Anemia	1.01 (0.94, 1.09)	1.00 (0.89, 1.11)	1.03 (0.95, 1.13)	1.03 (0.96, 1.10)
Arthritis	0.86 (0.75, 0.99)	2.07 (1.62, 2.63)	1.66 (1.39, 2.00)	2.08 (1.77, 2.43)
Blood Loss	0.83 (0.65, 1.06)	1.31 (0.88, 1.93)	1.16 (0.86, 1.56)	1.12 (0.87, 1.44)
CHF	0.91 (0.77, 1.07)	1.11 (0.89, 1.37)	0.96 (0.81, 1.13)	1.17 (1.02, 1.35)
Chronic Lung Disease	0.78 (0.73, 0.84)	1.15 (1.05, 1.26)	1.10 (1.02, 1.19)	1.06 (1.01, 1.13)
Coagulopathy	1.24 (1.09, 1.40)	0.88 (0.73, 1.08)	1.08 (0.93, 1.25)	1.07 (0.94, 1.23)
Depression	0.97 (0.89, 1.06)	1.36 (1.21, 1.53)	1.45 (1.30, 1.61)	1.24 (1.13, 1.36)
Diabetes	0.90 (0.82, 0.99)	1.00 (0.89, 1.13)	1.03 (0.93, 1.14)	1.13 (1.05, 1.22)
Diabetes w/ Complication	0.88 (0.75, 1.04)	1.61 (1.32, 1.98)	1.40 (1.18, 1.67)	1.52 (1.32, 1.75)
Drug abuse	0.69 (0.63, 0.77)	1.10 (0.97, 1.24)	1.23 (1.10, 1.38)	1.11 (1.02, 1.21)
Hypertension	0.88 (0.82, 0.94)	1.09 (1.00, 1.20)	1.00 (0.92, 1.07)	1.01 (0.96, 1.07)
Hypothyroidism	1.01 (0.94, 1.10)	0.96 (0.85, 1.08)	1.00 (0.91, 1.10)	0.96 (0.90, 1.03)
Liver disease	0.94 (0.82, 1.08)	1.52 (1.27, 1.82)	1.61 (1.35, 1.92)	1.32 (1.18, 1.48)
Lymphoma	0.71 (0.41, 1.22)	0.94 (0.51, 1.73)	0.97 (0.56, 1.67)	0.96 (0.64, 1.44)
Electrolyte disorder	1.23 (1.15, 1.32)	1.19 (1.07, 1.33)	1.28 (1.17, 1.39)	1.34 (1.24, 1.44)
Metastatic cancer	1.30 (0.90, 1.86)	1.24 (0.72, 2.13)	1.07 (0.67, 1.72)	0.94 (0.66, 1.35)

Obesity	0.99 (0.91, 1.07)	1.22 (1.08, 1.37)	1.26 (1.14, 1.39)	1.18 (1.09, 1.27)
Paralysis	1.08 (1.01, 1.15)	1.00 (0.91, 1.11)	0.86 (0.79, 0.92)	0.95 (0.90, 1.01)
Peripheral vascular disease	0.87 (0.75, 1.02)	1.18 (0.98, 1.43)	1.05 (0.91, 1.21)	1.37 (1.20, 1.57)
Psychoses	0.69 (0.65, 0.74)	0.99 (0.92, 1.08)	1.06 (0.99, 1.13)	1.20 (1.14, 1.27)
Pulmonary circulation disorder	0.92 (0.74, 1.14)	1.06 (0.78, 1.44)	0.81 (0.65, 1.02)	0.93 (0.75, 1.15)
Renal failure	0.95 (0.80, 1.13)	0.91 (0.74, 1.13)	0.92 (0.77, 1.10)	1.02 (0.88, 1.19)
Tumor	1.13 (0.98, 1.30)	1.54 (1.23, 1.92)	1.20 (1.01, 1.43)	1.37 (1.19, 1.57)
Ulcer	0.69 (0.27, 1.74)	2.35 (0.54, 10.16)	0.90 (0.34, 2.38)	1.51 (0.71, 3.22)
Valvular disease	1.03 (0.88, 1.21)	0.95 (0.76, 1.19)	0.81 (0.69, 0.94)	1.06 (0.90, 1.24)
Weight loss	1.00 (0.90, 1.12)	0.88 (0.75, 1.03)	1.05 (0.93, 1.19)	1.07 (0.96, 1.19)
Injuries	1.21 (1.13, 1.29)	1.23 (1.11, 1.36)	1.27 (1.18, 1.37)	1.30 (1.22, 1.38)
Developmental disabilities	1.43 (1.35, 1.52)	0.51 (0.47, 0.55)	0.59 (0.55, 0.63)	0.65 (0.62, 0.69)
Neurologists per 100,000	0.99 (0.98, 0.99)	1.00 (0.99, 1.01)	1.00 (0.99, 1.00)	1.00 (1.00, 1.01)

* This model excluded those with missing rurality in order to converge.

eTable 3. Received care from a neurologist by race/ethnicity

Race/Ethnicity	N	Care from a neurologist, n (%)
White	41975	21044 (50.1)
Black	17729	9023 (50.9)
AIAN	505	162 (32.1)
Asian	1246	342 (27.4)
Hispanic	9376	1889 (20.1)
NHOPI	1154	153 (13.3)
Other	6549	3181 (48.6)

eTable 4. ASM Generation by State, n (%) by row.

State	First Generation	Second Generation	Third Generation
CA, n = 25,617	7,303 (28.5)	16,254 (63.5)	2,060 (8.0)
GA, n = 6,877	1,668 (24.3)	4,634 (67.4)	575 (8.4)
IA, n = 1,758	427 (24.3)	1,128 (64.2)	203 (11.5)
MI, n = 9,388	2,229 (23.7)	6,192 (66.0)	967 (10.3)
MN, n = 3,079	697 (22.6)	2,090 (67.9)	292 (9.5)
MO, n = 3,849	791 (20.6)	2,648 (68.8)	410 (10.7)
MS, n = 3,214	1,069 (33.3)	1,960 (61.0)	185 (5.8)
NJ, n = 3,896	1,074 (27.6)	2,434 (62.5)	388 (10.0)
PA, n = 8,916	2,294 (25.7)	5,834 (65.4)	788 (8.8)
SD, n = 387	142 (36.7)	223 (57.6)	22 (5.7)
TN, n = 7,159	1401 (19.6)	4,739 (66.2)	1,019 (14.2)
UT, n = 936	233 (24.9)	555 (59.3)	148 (15.8)
VT, n = 444	88 (19.8)	328 (73.9)	28 (6.3)
WV, n = 2,758	646 (23.4)	1,915 (69.4)	197 (7.1)
WY, n = 256	53 (20.7)	170 (66.4)	33 (12.9)