Report on AQI Bayesian hierarchical modeling

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We build various random effects model with either insurance status (pay) or median income in the home zip code of the patients as primary predictor and added variables like institution or procedure cpt codes as random effects, sometimes nested.

```
## [1] 8
```

Model summaries outcome: ondansetron administration

Stanfit 3.0

```
## ond ~ pay + age_group + sex + (1 | cpt) + (1 | prov)
```

	odds.ratios
(Intercept)	3.497
payMEDICAID	0.793
payMedicare	0.760
paySELF	0.840
age_groupUnder 1	0.075
age_group1-18	1.274
age_group50 - 64	0.764
age_group65 - 79	0.729
age_group80+	0.503
sexmale	0.744
b[(Intercept) 0182T]	1.675
b[(Intercept) 0256T]	0.103
b[(Intercept) 0257T]	0.073
b[(Intercept) 0258T]	0.232
b[(Intercept) 0262T]	2.356
b[(Intercept) 0274T]	2.030
b[(Intercept) 10021]	0.376
b[(Intercept) 10022]	0.147
b[(Intercept) 10060]	0.482
b[(Intercept) 10061]	0.595

Stanfit 4.0

```
## ond ~ pay + age_group + sex + (1 | cpt) + (prov | practice)
```

	odds.ratios
(Intercept)	1.475
payMEDICAID	0.772

	odds.ratios
payMedicare	2.411
paySELF	9.793
age_groupUnder 1	0.000
age_group1-18	2.151
age_group50 - 64	2.216
age_group65 - 79	0.261
age_group80+	0.386
sexmale	0.931
b[(Intercept) 0182T]	1.000
b[(Intercept) 0256T]	1.000
b[(Intercept) 0257T]	1.000
b[(Intercept) 0258T]	1.000
b[(Intercept) 0262T]	1.000
b[(Intercept) 0274T]	1.000
b[(Intercept) 10021]	1.000
b[(Intercept) 10022]	1.000
b[(Intercept) 10060]	1.000
b[(Intercept) 10061]	1.000

Nesting providers in institutions distorted results.

Stanfit 6.0

```
## ond ~ pay + age_group + sex + ASA + anes_type + (1 | cpt) + (1 |
##     prov)
```

	odds.ratios
(Intercept)	7.305
payMEDICAID	0.840
payMedicare	0.841
paySELF	0.874
age_groupUnder 1	0.061
age_group1-18	0.896
age_group50 - 64	0.855
age_group65 - 79	0.851
age_group80+	0.673
sexmale	0.749
ASA2	0.882
ASA3	0.674
ASA4	0.250
ASA5	0.011
anes_typeNeuroaxial	0.087
anes_typeRegional	0.089
anes_typeMAC	0.089
b[(Intercept) 0182T]	1.230
b[(Intercept) 0256T]	0.184
b[(Intercept) 0257T]	0.169

Stanfit 7.0

```
## ond ~ pay + age_group + sex + ASA + anes_type + practice + (1 |
##     cpt) + (1 | prov)
```

	odds.ratios
(Intercept)	3.045
payMEDICAID	0.848
payMedicare	0.849
paySELF	0.853
age_groupUnder 1	0.063
age_group1-18	0.911
age_group50 - 64	0.858
age_group65 - 79	0.849
age_group80+	0.676
sexmale	0.750
ASA2	0.879
ASA3	0.670
ASA4	0.249
ASA5	0.012
anes_typeNeuroaxial	0.089
anes_typeRegional	0.090
anes_typeMAC	0.090
practiceD	1.582
practiceE	4.193
practiceF	1.832

	odds.ratios	2.5%	97.5%
(Intercept)	3.045	0.132	2.025
payMEDICAID	0.848	-0.214	-0.114
payMedicare	0.849	-0.221	-0.110
paySELF	0.853	-0.328	0.012
age_groupUnder 1	0.063	-3.002	-2.555
age_group1-18	0.911	-0.196	0.011
age_group50 - 64	0.858	-0.207	-0.098
age_group65 - 79	0.849	-0.228	-0.095
age_group80+	0.676	-0.475	-0.292
sexmale	0.750	-0.331	-0.249
ASA2	0.879	-0.227	-0.031
ASA3	0.670	-0.501	-0.301
ASA4	0.249	-1.510	-1.284
ASA5	0.012	-5.052	-3.917
anes_typeNeuroaxial	0.089	-2.535	-2.315
anes_typeRegional	0.090	-2.568	-2.244
anes_typeMAC	0.090	-2.497	-2.319
practiceD	1.582	-0.457	1.452
practiceE	4.193	0.479	2.423
practiceF	1.832	-0.337	1.557

Stanfit 8.0

log link did not converge

Model summaries outcome any antiemetic adminstration

Stanfit7.any

```
## any ~ pay + age_group + sex + ASA + anes_type + practice + (1 |
##     cpt) + (1 | prov)
```

	odds.ratios
(Intercept)	3.679
payMEDICAID	0.844
payMedicare	0.834
paySELF	0.851
age_groupUnder 1	0.070
age_group1-18	0.867
age_group50 - 64	0.829
age_group65 - 79	0.799
age_group80+	0.627
sexmale	0.722
ASA2	0.909
ASA3	0.657
ASA4	0.237
ASA5	0.018
anes_typeNeuroaxial	0.079
anes_typeRegional	0.085
anes_typeMAC	0.082
practiceD	1.579
practiceE	4.565
practiceF	2.221

Stanfit8.any

```
## any ~ income + age_group + sex + ASA + anes_type + practice +
##     (1 | cpt) + (1 | prov)
```

	odds.ratios
(Intercept)	15.907
income	1.301
age_groupUnder 1	0.063
age_group1-18	0.892
age_group50 - 64	0.828
age_group65 - 79	0.739
age_group80+	0.585
sexmale	0.738
ASA2	0.878

	odds.ratios
ASA3	0.608
ASA4	0.203
ASA5	0.016
anes_typeNeuroaxial	0.067
anes_typeRegional	0.049
anes_typeMAC	0.064
practiceF	0.481
b[(Intercept) 0256T]	0.141
b[(Intercept) 0257T]	0.146
b[(Intercept) 0258T]	0.221
b[(Intercept) 0262T]	1.697

Stanfit9.any

```
## any ~ incomeQ + age_group + sex + ASA + anes_type + practice +
##     (1 | cpt) + (1 | prov)
```

	odds.ratios
(Intercept)	17.100
incomeQlow	1.063
incomeQmiddle	1.142
incomeQhigh	1.221
age_groupUnder 1	0.063
age_group1-18	0.896
age_group50 - 64	0.830
age_group65 - 79	0.743
age_group80+	0.588
sexmale	0.738
ASA2	0.877
ASA3	0.603
ASA4	0.201
ASA5	0.015
anes_typeNeuroaxial	0.067
anes_typeRegional	0.049
anes_typeMAC	0.065
practiceF	0.488
b[(Intercept) 0256T]	0.141
b[(Intercept) 0257T]	0.142

Stanfit10.any

```
## any ~ incomeQ + pay + age_group + sex + ASA + anes_type + practice +
##     (1 | cpt) + (1 | prov)
```

	odds.ratios
(Intercept)	17.933
incomeQlow	1.043

	odds.ratios
incomeQmiddle	1.104
incomeQhigh	1.165
payMEDICAID	0.863
payMedicare	0.829
paySELF	0.829
age_groupUnder 1	0.064
age_group1-18	0.901
age_group50 - 64	0.827
age_group65 - 79	0.806
age_group80+	0.650
sexmale	0.738
ASA2	0.886
ASA3	0.625
ASA4	0.209
ASA5	0.016
anes_typeNeuroaxial	0.067
anes_typeRegional	0.048
anes_typeMAC	0.064