Report on AQI Bayesian hierarchical modeling

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We build various random effects model with either insurance status [**pay**] or median income [**IncomeQ**] (as quantile) in the home zip code of the patients as primary predictor and added as fixed effects demographics like institution [**practice**], gender [**sex**], ASA classification [**ASA**] and as random effects procedure [**cpt**] code or anesthesia provider [**provider**]. The models are more formally described in Appendix 1.

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

Model summaries for the primary outcome [ond]: 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
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

This was the model we reported in detail in the manuscript.

```
## 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	1.141	7.578
payMEDICAID	0.848	0.807	0.892
payMedicare	0.849	0.802	0.896
paySELF	0.853	0.720	1.012
age_groupUnder 1	0.063	0.050	0.078
age_group1-18	0.911	0.822	1.011
age_group50 - 64	0.858	0.813	0.907
age_group65 - 79	0.849	0.796	0.910
age_group80+	0.676	0.622	0.747
sexmale	0.750	0.718	0.779
ASA2	0.879	0.797	0.970
ASA3	0.670	0.606	0.740
ASA4	0.249	0.221	0.277
ASA5	0.012	0.006	0.020
anes_typeNeuroaxial	0.089	0.079	0.099
anes_typeRegional	0.090	0.077	0.106
anes_typeMAC	0.090	0.082	0.098
practiceD	1.582	0.633	4.272
practiceE	4.193	1.615	11.283
practiceF	1.832	0.714	4.744

Stanfit 8.0

log link did not converge

Model summaries for the 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