

Logistic regression AQI data

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Insurance status predicts antiemetic use

We investigate the Hypothesis that insurance status predicts antiemetic use the population in the Public Use File of the Anesthesia Quality Institute with electronic anesthesia records recording antiemetic use.

Load cleaned dataset *fullAQI_4_14* and *prov1_AQI_4_14*

we load the cleaned larger dataset without and with provider information *fullAQI_4_14.Rdata*, *prov1_AQI_4_14*, which we generated in *import_AQI_14Jul2015.Rmd*

```
rm(list = ls())
load("Analysis/Data/fullAQI_4_14.Rdata")
load("Analysis/Data/prov1_AQI_4_14.Rdata")
str(fullAQI_4_14)
```

```
## 'data.frame': 173133 obs. of 12 variables:
## $ ond : Factor w/ 2 levels "no Ondan","Ondan": 2 1 2 1 1 2 2 2 1 2 ...
## $ dex : Factor w/ 2 levels "no Dex","Dex": 1 1 1 1 1 1 1 1 1 1 ...
## $ drop : Factor w/ 2 levels "no Drope","Drope": 1 1 1 1 1 1 1 1 1 1 ...
## $ any : Factor w/ 2 levels "neither","either": 2 1 2 1 1 2 2 2 1 2 ...
## $ pay : Factor w/ 4 levels "Commercial","MEDICAID",...: 1 1 1 3 1 3 2 1 3 1 ...
## $ age : int 50 53 58 73 64 73 19 27 85 59 ...
## $ age_group: Factor w/ 6 levels "19 - 49","50 - 64",...: 2 2 2 3 2 3 1 1 4 2 ...
## $ sex : Factor w/ 2 levels "female","male": 2 2 1 2 2 1 1 1 2 2 ...
## $ ASA : Factor w/ 6 levels "1","2","3","4",...: 2 3 3 2 3 3 2 2 3 2 ...
## $ duration : int 59 43 190 56 37 116 93 108 70 93 ...
## $ anes_type: Factor w/ 7 levels "General","Neuroaxial",...: 1 4 1 2 3 1 2 1 1 1 ...
## $ practice : Factor w/ 4 levels "A","B","C","D": 2 2 2 2 2 2 2 2 2 2 ...
```

```
str(prov1_AQI_4_14)
```

```
## 'data.frame': 146879 obs. of 13 variables:
## $ ond : Factor w/ 2 levels "no Ondan","Ondan": 2 1 2 2 2 2 1 1 2 2 ...
## $ dex : Factor w/ 2 levels "no Dex","Dex": 1 1 1 1 1 2 1 1 1 2 ...
## $ drop : Factor w/ 2 levels "no Drope","Drope": 1 1 1 1 1 1 1 1 1 1 ...
## $ any : Factor w/ 2 levels "neither","either": 2 1 2 2 2 2 1 1 2 2 ...
## $ pay : Factor w/ 4 levels "Commercial","MEDICAID",...: 3 2 1 1 3 1 1 1 3 1 ...
## $ age : int 73 31 56 59 64 49 36 45 62 26 ...
## $ age_group: Factor w/ 6 levels "19 - 49","50 - 64",...: 3 1 2 2 2 1 1 1 2 1 ...
## $ sex : Factor w/ 2 levels "female","male": 1 1 2 2 1 2 2 1 1 2 ...
## $ ASA : Factor w/ 6 levels "1","2","3","4",...: 4 3 2 2 3 1 2 2 3 2 ...
## $ duration : int 172 80 172 122 133 83 136 81 112 110 ...
## $ anes_type: Factor w/ 7 levels "General","Neuroaxial",...: 1 1 1 1 1 1 1 1 1 1 ...
## $ provider : Factor w/ 720 levels "5622","5623",...: 161 155 152 163 156 156 161 161 156 153 ...
## $ practice : Factor w/ 4 levels "A","B","C","D": 2 2 2 2 2 2 2 2 2 2 ...
```

Logistic Regression

Logistic Model 1 Link: logit

We first fit a logistic regression model with the a **logit** link, saved in *LogisticRegression_AQIFixedEffects_LogitLink* as shown below:

```
formula <- ond ~ pay +age_group +sex +ASA +anes_type +duration +practice

fit_logistic <- glm(formula,
  family = binomial(link = "logit"),
  data = fullAQI_4_14)
```

Summary: Controlling for age, sex, facility and case duration, antiemetic administration is strongly associated with insurance status as a marker of SES, but the OR is not as strong as previously estimated controlling for fewer variables. it makes sense that controlling for likely confounders like anesthesia type and ASA status reduces the effect estimate.

Logistic Model 2 Link : log

We try to fit a logistic regression model with the a **log** link.

```
formula <- ond ~ pay +age_group +sex +duration

fit_logistic <- glm(formula,
  family = binomial(link = "log"),
  data = fullAQI_4_14)
```

	OR	X2.5..	X97.5..	p_values
(Intercept)	0.624	0.618	0.630	0.00
payMEDICAID	0.778	0.766	0.789	0.00
payMedicare	0.887	0.875	0.899	0.00
paySELF	1.017	0.974	1.059	0.44
age_group50 - 64	1.035	1.024	1.047	0.00
age_group65 - 79	0.916	0.903	0.930	0.00
age_group80+	0.702	0.684	0.720	0.00
age_groupUnder 1	0.290	0.267	0.313	0.00
age_group1-18	1.122	1.103	1.142	0.00
sexmale	0.955	0.946	0.964	0.00
duration	1.000	1.000	1.000	0.00

Summary: We are unable to fit a log link model with all predictors, because we get the error message:

Error: no valid set of coefficients has been found: please supply starting values

If we use more predictors than these: